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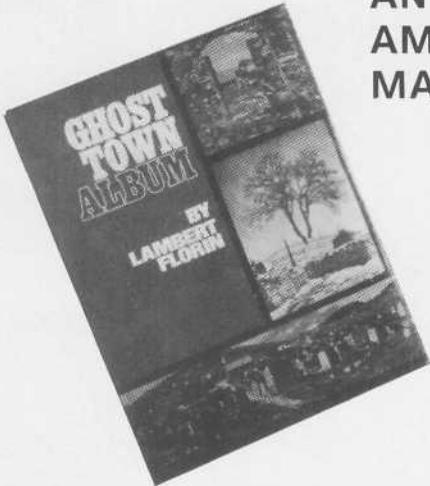
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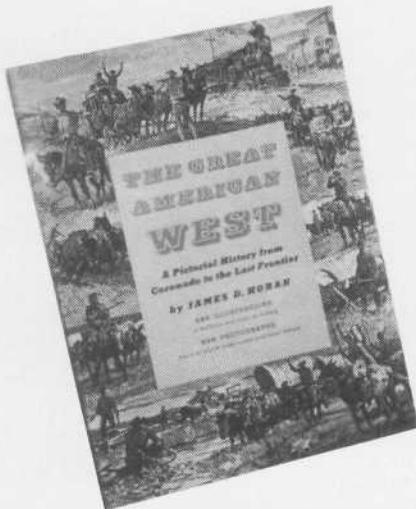


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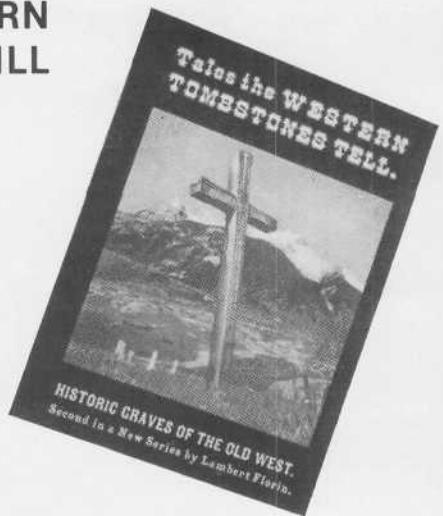
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Volume 37, Number 3

MARCH, 1974

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The stately Joshua tree,
in California's Joshua
Tree National Monument.
Photo by Howard Neal,
Arcadia, California.

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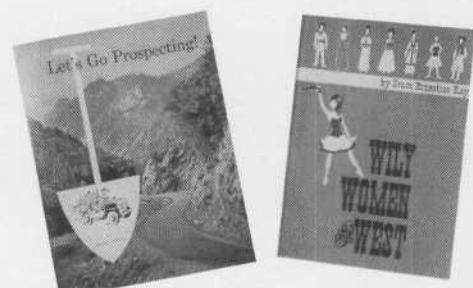
BACKPACKING by R. C. Rethmel. Stresses caution and confidence in this popular sport and includes details about equipment, clothing, food and techniques for trail and camp preparation. Good for the novice, too, who wants to go wilderness camping with family or a few friends. Paperback, \$3.95; Hardcover, \$6.95.

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THE WEST

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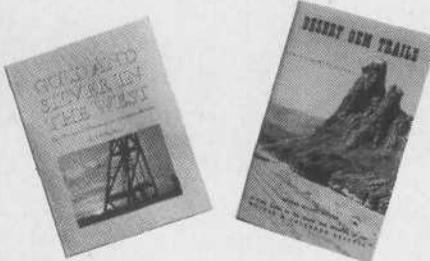
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GHOSTS OF THE GLORY TRAIL by Nell Murbarger. A pioneer of the ghost town explorers and writers, Miss Murbarger's followers will be glad to know this book is once again in print. First published in 1956, it is now in its seventh edition. The fast-moving chronicle is a result of personal interviews of old-timers who are no longer here to tell their tales. Hardcover, illustrated, 291 pages, \$7.00.

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THE STERLING LEGEND by Estee Conatser. The story of the Lost Dutchman Mine is in a class of its own. Here the author presents the Jacob Walzer story in a realistic and plausible manner. An introduction by Karl von Mueller, and a map insert leaves the reader to draw his own conclusions between fact and fiction. Paperback, illustrated, 98 pages, \$3.50.

HOW AND WHERE TO PAN GOLD by Wayne Winters. Convenient paperback handbook with information on staking claims, panning and recovering placer gold. Maps and drawings. \$2.00.



ON DESERT TRAILS by Randall Henderson, founder and publisher of Desert Magazine for 23 years. One of the first good writers to reveal the beauty of the mysterious desert areas. Henderson's experiences, combined with his comments on the desert of yesterday and today, make this a MUST for those who really want to understand the desert. 375 pages, illustrated. Hardcover, \$6.95.

LOST MINES OF THE GREAT SOUTHWEST by John D. Mitchell. The first of Mitchell's lost mine books is now available after having been out of print for years. Reproduced from the original copy and containing 54 articles based on accounts from people Mitchell interviewed. He spent his entire adult life investigating reports and legends of lost mines and treasures of the Southwest. Hardcover, illustrated, 175 pages, \$7.50.

LOST MINES & BURIED TREASURES ALONG THE OLD FRONTIER by John D. Mitchell. The second of Mitchell's books on lost mines which was out-of-print for many years. Many of these appeared in DESERT Magazine years ago and these issues are no longer available. New readers will want to read these. Contains the original map first published with the book and one pinpointing the areas of lost mines. Mitchell's personal research and investigation has gone into the book. Hardcover, 240 pages, \$7.50.

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Books for Desert Readers

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DICTIONARY OF
PREHISTORIC
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By
Franklin Barnett



A highly informative book that both illustrates and describes Indian artifacts of the Southwest, it is a valuable guide for the person interested in archaeology and anthropology. Dealing with the period prior to recorded history (1540), it covers artifacts from four basic major Indian cultures.

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West of the Mogollon Culture, the Hohokam Culture existed pre A.D. 1 to 1400. To the west of these cultures, the Patayan Culture came into existence about B.C. 4,000, but the culture dated circa A.D. 200 to 1,300 is best known.

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Here, under one cover, is a complete, factual and interesting handbook for the desert vacationer. From desert vehicles through camping hints to staying out of trouble, it contains all the information you will need to have a safe and delightful desert vacation.

This $5\frac{1}{2} \times 8\frac{1}{2}$ book tells you: Where to go; What to do when you get to where you are going; How to locate your camp, and where; Things to do (and not do!); Information on desert wildlife, mines, ghost towns and desert hobbies; Emergencies and how to handle them . . . And how to enjoy doing nothing.

Desert Vacations are Fun is based on the experience gained by the author from hundreds of camping trips in the remote desert areas of California and Arizona. From the Utah border to *El Camino del Diablo* along the Mexican border and into the back country of Death Valley, the author has been there. He has experienced countless days and

nights of delightful and unforgettable camping in this beautiful "out back" of the West. He shares his experiences with you in this book.

Enjoy a brief history of the people who opened up our western desert lands, from the '49ers to the prospectors of awesome Death Valley. And in between, the story of the Comstock Lode of the Nevada desert. Learn about the American deserts and desert climate; why the deserts are the way they are. Explore the many facets of desert camping and find out how to begin your desert venture. Valuable information on weather conditions, desert vehicles, campsites, food and water requirements, how to conduct yourself in the desert, CB radios, firearms and desert emergencies.

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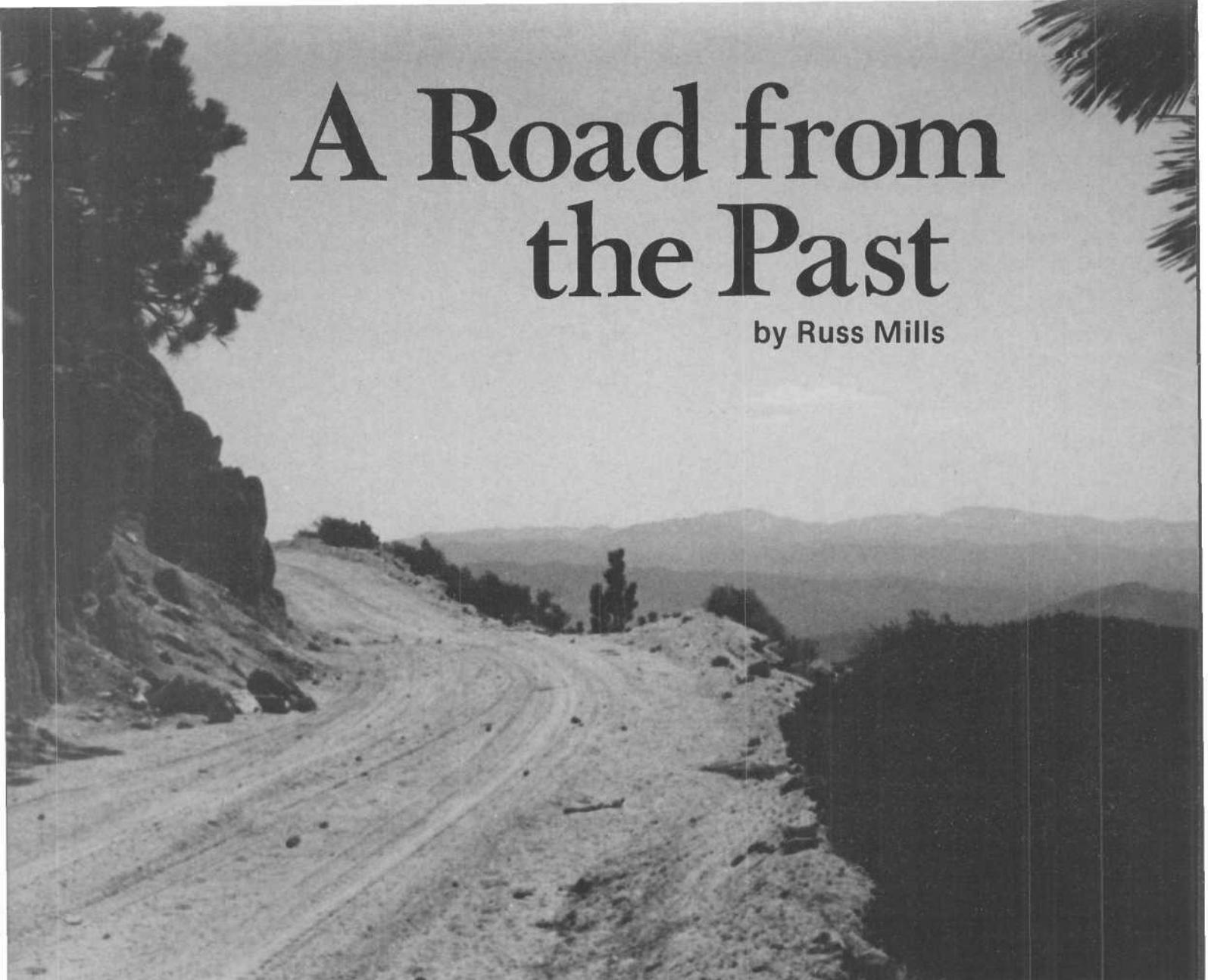
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A Road from the Past

by Russ Mills



Kings Canyon Road looking southeast toward Carson Valley.

TRAVEL ALONG ONE OF THE FEW HISTORIC STAGECOACH AND WAGON ROADS THAT HAS NOT BEEN WIDENED OR PAVED TO ACCOMMODATE MODERN VEHICLES. COMPLETED IN 1863 KINGS CANYON ROAD, FROM CARSON CITY TO LAKE TAHOE, REMAINS ESSENTIALLY THE SAME SOME 111 YEARS LATER.

THROUGHOUT THE Far West, few roads remain that once were bathed in the dust from wooden wheels and rattling hoofs. Just as the stagecoaches and wagons have been replaced by buses and autos, so have most of the old trails and roadways been buried under asphalt and concrete.

The gold strikes in Virginia City, Nevada in the early 1860s, generated the building of two lumber roads on the east side of the Carson Range. One of the roads evolved from an old emigrant trail while the other was hacked out of the dirt and rock.

Today, the emigrant trail, buried under asphalt, is U. S. Highway 50, Clear Creek grade, an efficient four-lane thoroughfare that carries the noisy traffic

from Nevada's capital to Lake Tahoe. The other, however, is Kings Canyon road, a narrow dirt and rock roadway where only the imaginary echoes of clattering hoofs and creaking wagons disturb the quiet.

Prior to the road's construction, the Comstock Lode's expanding timber requirements created a lumber boom at Lake Tahoe that started in 1861 at Glenbrook, on the eastern shore of the lake. In this scenic cove of meadowland, surrounded by vast stands of pine and fir, the logs were freighted up Glenbrook Canyon, past Spooners to Summit Camp, then down the old emigrant trail in Clear Creek Canyon to Carson City. Later, as freight traffic increased with Virginia City's boom, the additional road was

needed to connect the Glenbrook sawmills to Carson City.

Originally known as the Lake Bigler Toll Road, Kings Canyon road was completed on the 6th of August, 1863. Near Summit Camp, at the top of Clear Creek grade, the Kings Canyon "turnpike" branched off to the northeast and emerged 12 miles later from Kings Canyon into the center of Carson City. Although it was created to handle the additional traffic, it was also intended as a stagecoach road.

Benton's Stage Lines in Carson City used it as their primary route on the Carson City-Glenbrook run, while Clear Creek grade was the alternate. However, the Kings Canyon Toll Road was not only a route from Carson City to Lake Tahoe,

but also was the last leg of the passage over the Sierras from San Francisco to Virginia City on the Placerville-Echo Summit run.

The continuing flurry of activity, plus Lake Tahoe's growing recreation spots, attracted workers, drifters, and tourists to the area, keeping all of the stage lines busy. The boom continued until the 1890s when the mining declined and the mills closed, causing Kings Canyon road to fall into disuse.

Today, the drive over Kings Canyon grade is not as perilous as in the stagecoach era, but the road is, nevertheless, quite narrow in places and occasionally rough.

From the center of Carson City you proceed west on King Street, and in a

A narrow section looking east with supporting rock retaining wall.





sharp, creek-eroded gullies

Here, as the sage gives way to manzanita and bitterbrush, you are suddenly treated to a beautiful panoramic view of Carson Valley to the southeast. The valley's fertile grassland stretches to the south encircling the towns of Minden and Gardnerville. This is also a good location to look south, where valley meets mountain, and see the typical steep eastern escarpment of the Sierras. Nestled at the edge of the valley under the peaks, although it is not visible from the road, is Genoa, the oldest town in Nevada.

Below the road some distance away, Clear Creek grade twists its way toward the north side of the canyon where it will run parallel with Kings Canyon for about three miles. The old Clear Creek grade, which more closely followed the original emigrant trail, is still visible in the lower part of the canyon, south of the present highway.

Though the road is not too steep in this section, it becomes narrower, especially at the sharp ravines where the creek and snow run-off tumble down the mountain to the meadow below. The thought of racing along in a Concord stagecoach could easily make one wish he were back in the valley.

For the next three miles, the road becomes somewhat rougher as the granite begins erupting through the surface. At the same time, large outcroppings along the bank seem to crowd you to the outside of the turns. A steeper drop-off occurs along this portion of the road and the outside shoulder is supported by a loose rock retaining wall. In many places some of the rocks are breaking off, leaving small cave-ins along the crumbling edge. If the previous section of roadway could make a stage traveler uneasy, this section would be downright frightening. The thought of those iron-rimmed wheels clattering along the protruding rock while the driver wheeled his team around sharp bends would be enough to give the modern day traveler a good case of the "willies."

And no driver could do a better job of "wheeling" than the legendary Hank Monk, "master whip of the Sierra." Hank's colorful career was built upon a reputation of wild tales and wild rides. A desire for his travelers to meet their appointments on time, and his penchant for "distilled spirits," were a combination

Beginning the climb around granite-studded mountainside.

few blocks cross the city limits into the lower section of the sage-dotted canyon as it widens into the valley. The fertile ground here supports grass and poplar trees where the old ranches and toll house were located. Beyond the homes now sprouting up, the road turns to dirt and begins climbing along the north hill-

side. Kings Canyon itself extends only a short distance, and as the road continues through the sage and pines, the top narrows to a crest, then drops away on the left to a meadow far below. Past the crest, the road is perched high on the side of a steep, granite and brush-studded mountain, snaking its way past the

In the forest area, the road is wider and not as rough, though steep through most of the area.



that left a stagecoach ride stamped forever on his passengers' memories.

Near the end of this steep and rocky part of the drive, a turnout has been cleared on a small promontory. This is the last place on this section of the road from which to enjoy the magnificent, unobstructed view of the valley.

Past the turnout, the road descends into the forest and meanders through the heavy stands of pine and cedar. Alder and aspen-lined ravines funnel the creeks into the valley, and in a few locations the browns and greens of the forest floor are punctuated sharply by the brilliant scarlet of the snow plant. In direct contrast to the white, granite-strewn hill-sides of the previous stretch of the road, the cool shade of the pines and soft needle-covered soil have a relaxing effect — much the same as the pioneers must have felt a century ago.

At a spot about two and a half miles from the summit is the site of Swift's Station, the only stop-off on the old Kings Canyon run. This was a scheduled rest on the Carson City-Glenbrook trip, and it was used as an eating and overnight stop for the stage and wagon traffic in general. As with many historic sites in the West, nothing remains of Swift's Station today.

West of the station site, the road climbs again along the east side of the mountain and finally descends to join Clear Creek grade east of Spooners Summit.

Kings Canyon road may not have the spectacular scenery, awesome heights, or magnificent flora of other western highways and trails, but it is one of the few historic stagecoach and wagon roads that have not been widened, straightened, and paved to accommodate today's vehicles. With the exception of a road grader and occasional patching, it remains essentially the same road that was gradually worn down by the horses, wheels and oxen of Lake Tahoe's lumbering days.

Although many highways pass through historic locations, the reflection of history in the mind's eye is usually blurred by the high speed distractions of the freeway. On Kings Canyon road, however, the solitude and leisurely pace, combined with a knowledge of the area's past, can easily transport you back through time; a far more interesting way to enjoy a drive. □



Above: Looking southeast, one can almost picture a stagecoach wheeling 'round the curve. Below: Lower Kings Canyon with the road visible on the upper right, heading for the crest.

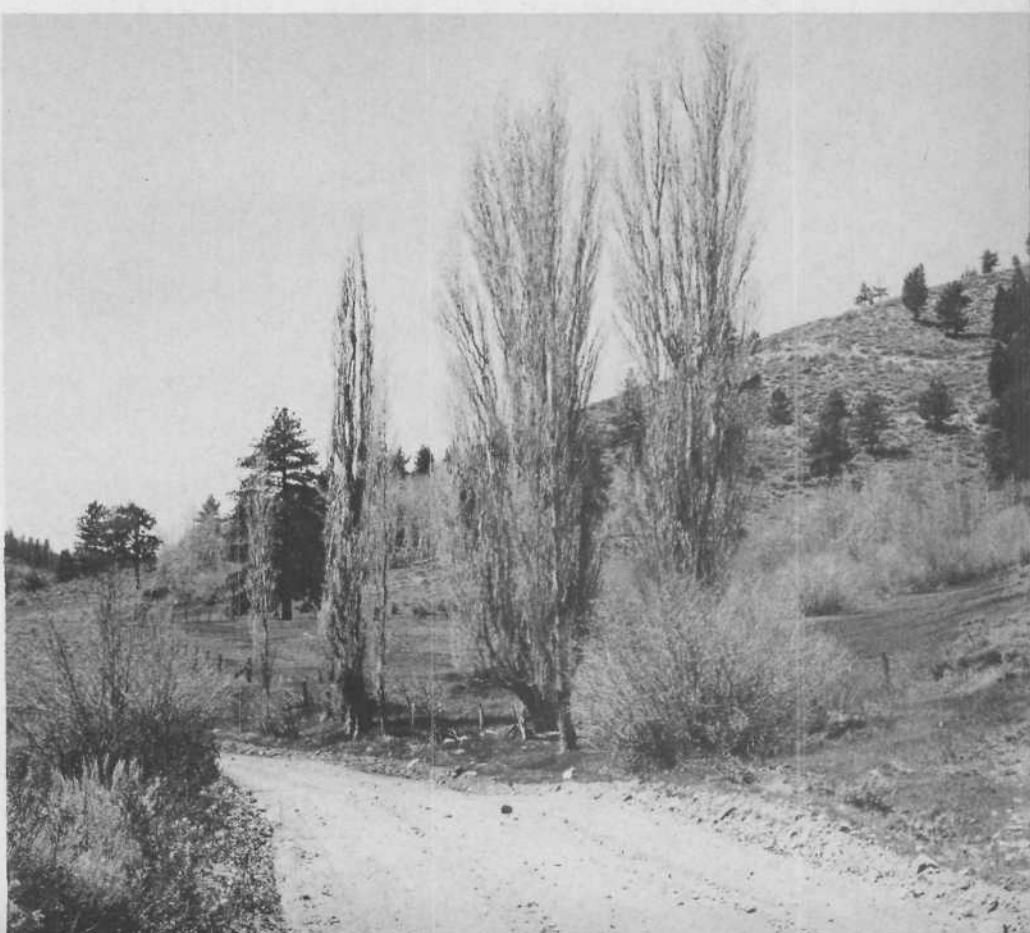




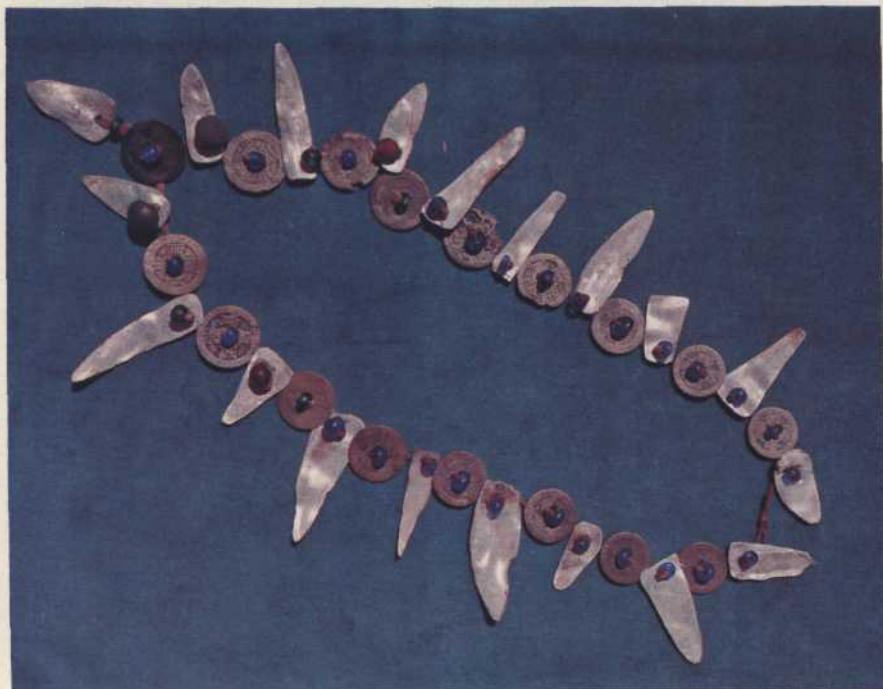
Figure 51-A

AUTHOR'S PREFACE
The simple glass bead presents one of the most complex and intriguing histories that can be imagined, and one difficult to write about. The advanced students of trade bead history will likely find little in this article that is new to them. However, this material was written especially for the majority of the people who have perhaps not been aware of the important part that the glass trade bead played in early American history, and it was written only after extensive

TRADE BEADS OF

by James B. Freestone

Figure 55-A



THE INTRODUCTION of the glass trade bead into Northwestern America marked the advent of a new era in the history of our country as they, together with other trade goods, were responsible for the cultural, financial and moralistic changes that were brought about in the life of the American Indian. Today, it is difficult to visualize the magnitude that a simple bauble of glass played in the subjugation and acculturation of the native Indians. Twenty dollars worth of beads bought today in any ten-cent store would have netted a king's ransom 150 years ago.

In this article, we will deal with trade beads that were made of glass, metal, shell, stone and bone and were used as a medium of exchange between Indians of different tribes, fur companies, trading ships of many nations, mountain men and religious leaders. The latter, of course, used glass beads as an article in the creation of good will with the Indians.

research, investigation and collecting that involved thousands of miles of travel in the Western United States and Canada over a period of years. Numerous revisions have taken place as the author acquired additional information. But all material presented in this article can be verified by documented evidence. Therefore, the readers of this account can rest assured that what they read is accurate within reason. Consequently, the writer, with this thought in mind, has held supposition to a minimum.



Figure 56-A

THE NORTHWEST

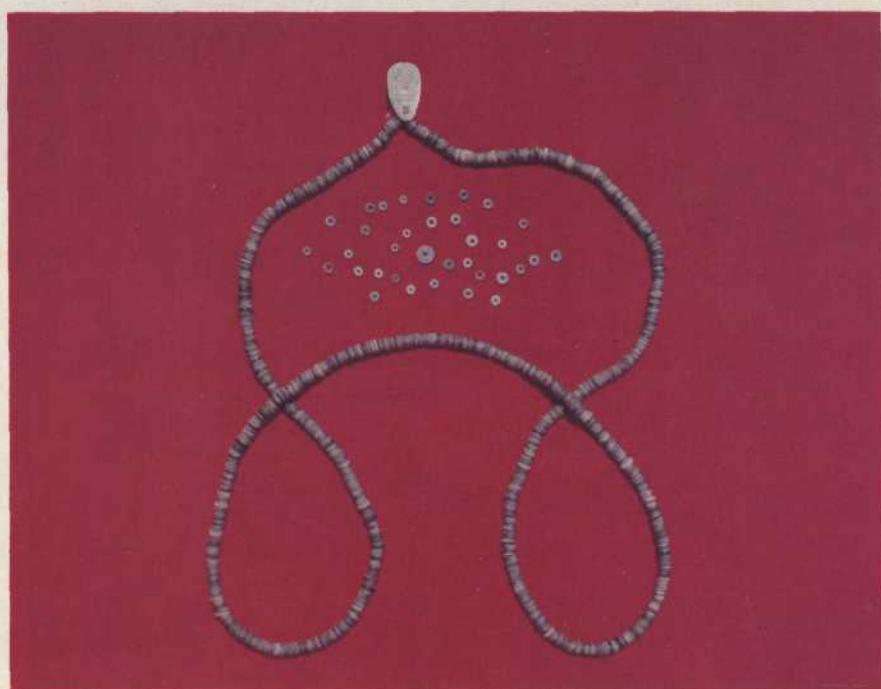
Color photos by Erland Preece

The so called "glass" Indian trade bead is somewhat misleading as the Indian did not work with glass, but rather with shell, bone, metal and stone. When the glass bead became available to the Indians, they were being used by the white people as well. Thus, at this time it seems appropriate to present a short history of the glass bead.

Beginning in the 13th century, and ending in the 19th century, the greater part of the glass beads, in almost endless varieties, were made at the strictly regulated glass factories at Murano, Venice. Here, the Inquisitors enforced social sanctions to the extent that any defection of a glass worker to another country, who refused to return to this former place of employment, could expect the culmination of his career in death. However, in the early part of the 19th century, a considerable number of glass beads were being made in France and Bohemia.

The various methods that were used in manufacturing glass beads would be vol-

Figure 53-A





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luminous. Therefore, only a brief summary will be presented on this subject.

In reality, the glass bead was made of basically the same material as ordinary glass. The color and quality of the product was achieved by the introduction of different mineral ingredients into the raw mixture before fusing it into the proper consistency necessary for the shaping of the finished product.

After the glass bead had been manufactured, those that were acceptable to the standards set for the type being made were sorted, packaged and sold to the numerous distributing companies who, in turn, bartered them to the great trading companies of the world. Then they were transported to far-flung outposts throughout the world where they were used as a medium of exchange with the natives.

In order that this article may present a reasonably full account of trade beads in Northwestern America, it is necessary at this time to revert to the time when the glass trade bead was unknown in America.

It is perhaps impossible to determine whether the dentalium shell or the handmade stone bead was the first to become an important item of exchange in Northwestern America. Therefore, we will deal with the known facts and let the readers draw their own conclusions. It is the opinion of the author that the discoidal and oblate spheriod stone beads were the first to be made.

At The Dalles, Oregon, there is a rather small area where tens of thousands of stone beads of different sizes and shapes have been found. Those found would represent only a small part of the total number that were made. They were, no doubt, an item of barter as the number present at this site are too numerous to have been utilized by the then indigenous population of the immediate area. Another possibility is that these beads were made at a different location sometime before the great Missoula flood which occurred in the late stages of the Wisconsin glacial period. At that time, about five cubic miles of water were released as the melting ice dam that was holding it back collapsed. This caused an enormous volume of water to enter the Columbia River Gorge where it reached a depth in excess of 1000 feet and at the present site of Portland, Oregon, the water was at least 400 feet deep.

Thus, if these stone beads were made at a different location, gravitational segregation and water current are suggested by the author as a possibility to account for the dense concentration of these beads at this particular place. This hypothesis seems plausible in view of the fact that the Indians who were first encountered when the white man arrived did not know of the existence of this "bead patch," and the extent of it was determined only after extensive excavation done by the white man in historic times. An alternative explanation is that a large prehistoric burial ground was located at this site and some great catastrophe occurred that caused its existence to become unknown.

It has also been suggested by qualified persons who have studied the situation, that this site was the place where these beads were made. Perhaps this is true, but it seems unlikely that the Indians, making beads of hard pyroclastic stone with very crude tools, would have lost such a large number within the small area in which they are found.

The dentalia shells entered the trade routes of the American Indian at a very early date and were used as an article of personal adornment by many tribes living in a vast area extending eastward into the Rocky Mountains and the Great Plains states, and as far south as northern California where they reached their peak of value.

The place where the dentalia shells were acquired was in a small area off the northwest coast of Vancouver Island. They were the exclusive item of barter of the Nootka Indians and their closely associated neighbors. The areas where they were found were the property of certain families and were carefully guarded secrets. The location of the dentalia beds was marked and known by a system of aligning natural features of the terrain with the known location of the dentalia beds. Only those people of rank and status high enough to be entrusted with the secret knew the natural features of the area that were used as "bearing points."

The method used in obtaining these shells was one that required patience and ingenuity as the dentalia shells were in quite deep water. First, enough poles were assembled that, when fastened end to end, they would reach the ocean floor. The first pole was splintered in such a

way that, when thrust hard at the ocean bottom, it would fray out much the same as a broom would do. Above this, a circular weight encompassed the pole which descended when the poles contacted the ocean bottom, compressing the splintered ends together, thereby entrapping all of the dentalia shells that may have been encountered. The poles were then allowed to float to the ocean surface and the shells were removed. After a sufficient number had been acquired, they were cleaned and packed in bark wallets and were ready for trade.

The lower Columbia River, from the ocean upstream to The Dalles, was controlled by the Chinook Indians who extracted toll on all trade items that involved transportation on the river. The Dalles was the location of the greatest Indian trading center in northwestern America. Here, numerous tribes, using the "Chinook jargon" as a language in common, gathered to exchange items that were a surplus in their native area for things from other areas that were in demand, to fill their needs. For example, slaves brought in by the Klamaths and other tribes from south of the Columbia River, were exchanged for dentalia from the Nootkas, Olachen oil from the Tsimshians, and packed salmon from the river tribes. The dentalium shell was one of the most important items of exchange, and up until the time when the beaver pelt became the standard of value, dentalia was considered the money of the Pacific Northwest. At The Dalles, this important trade item was traded to other Indians and was then transported thousands of miles along the Indian trade routes of Western America.

The Pomo Indians of Lake and Mendocino counties in California, made good beads from the mineral magnesite and used them extensively as a trade item up until the time when the white man replaced them with an imitation made of glass. This was a disappointing turn of events as the Pomo Indians had relied heavily upon these beads as an item of exchange with other tribes. However, this event may have been a blessing in disguise as the Pomos then turned to making baskets in a number of weaves, including some that were decorated with trade beads that were obtained from the Russians at Fort Ross, which was built by them at Bodega Bay in 1812 and marked the southern limit of Russian in-

fluence. The baskets were unexcelled anywhere and were difficult for the white man to duplicate.

Other types of beads were made by the American Indian, many of them being unique in fashion and material. The Indians of the Northwest made rolled metal beads of native and trade copper. Figure 51-A shows some of these beads, together with glass trade beads and brass thimbles. The thimbles were also used to make tinklers and as other adornments. The author has yet to find a thimble at an old Indian site without a hole in the top which indicates that the Indians turned an object of utility into one of ornamentation to best serve their own particular desires.

The prehistoric Basketmakers of northeastern Utah made many beads of a discoidal shape and small diameter. These beads present a baffling problem as to the method used in making them as they are so small that it is difficult to imagine how they were produced with such perfection. They are not all the same size, varying from one-eighth to one-quarter of an inch in diameter, but otherwise, they are as perfect as if made on a machine. It is the opinion of the author that these beads were being made before the introduction of ceramics into the Basketmaker culture, as some of them are found in sites that contain no signs of pottery sherds. If this opinion is, in fact true, then these beads would have been made in the first and second phases of the Fremont Basketmaker Culture, or about twelve to fourteen hundred years ago. Figure 53-A shows a string of these beads that were collected by the author in the Uintah Basin of Utah.

The Mimbre people, of southwestern New Mexico, made a similar bead of shell. Some of these are shown in Figure 54-A) and were traded at least as far north as southern Wyoming. In Figure 55-A, another interesting string of beads is shown. Here, Chinese coins were used in combination with abalone shells in making an attractive necklace which was washed from the banks of the Sacramento River at flood stage. The coins were no doubt obtained from early Chinese gold miners and show dates in excess of 100 years ago.

The Spanish were probably the first to trade beads with the Indians, beginning with the expedition of Coronado in 1540

Continued on Page 36

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Mining Mysteries of THE SAN GABRIEL MOUNTAINS

THE SAN GABRIEL Mountains provide the bulk of the high country in Los Angeles County—a citified county, but still with plenty of room for raw wilderness.

The San Gabriel Mountains are listed in the geology books as one of the transverse ranges of Southern California. The range runs the wrong way in comparison with the north-south trending Sierra.

The San Gabriel Mountains knew the Indians—the Gabrielino—the Spanish padres, early Americanos, a kind of mountain men, an influx of mining people after the Mother Lode excitement. Today, the range is hatched with paved roads and dotted with all kinds of civilization.

But the San Gabriel Mountains has held onto a few secrets. Mining secrets. The best kind for armchair adventurers. For most of these mining secrets are difficult to put on a map.

The secrets are somewhere inside the perimeter of the San Gabriel Mountains. But just where . . .

It is difficult to be annoyed at these unmapped secrets. But, then, if there was a road sign, how could these uncommon things be secrets at all?

Take the Lost Padres Mine. It would be an insult to the hundreds of treasure hunters, lost mine buffs, armchair his-

ON THE TRAIL with . . .
Russ Leadabrand

torians, to try to put this one all together for the hundredth time.

But along the Santa Monica Mountains, the Sespe Country, the various mountains in the Los Padres National Forest as far north as the Los Burros District, there have been stories about a lost mine that the mission padres operated prior to 1834. It was a mountain mine, according to the best of the accounts, and it produced gold in quantity. How much, is not written. How it was mined is only guessed at. Whether it was lost accidentally, or on purpose, is merely conjecture.

But the north end of the San Gabriel Mountains is one of the areas that supports the Lost Padres Mine.

There is a kind of a rationale for the tale. The area, just south of the Mill Creek Summit, a high place on the Angeles Forest Highway that runs north from Clear Creek to Vincent (and connecting La Canada with Palmdale), is mineralized. There are a couple of once-producing mines in the area, including the rather well-known Monte Cristo.

By airline miles, it is not far from the



Monte Cristo area to the mission at San Fernando. Hence some of those people who put legends together as a hobby, have surmised and allowed that the Lost Padres Mine could very neatly have existed in the San Gabrieles in the area of the Monte Cristo.

Maybe the Monte Cristo is, itself, part of the old mission mine site. (But there is no evidence or history to support this.) Maybe one of the side canyons up or down Mill Creek from the Monte Cristo hides the Lost Padres. (No evidence.) Yet, among many, this is the area of the Lost Padres gold mine. Not the Sespe, nor San Emigdio or Los Burros.

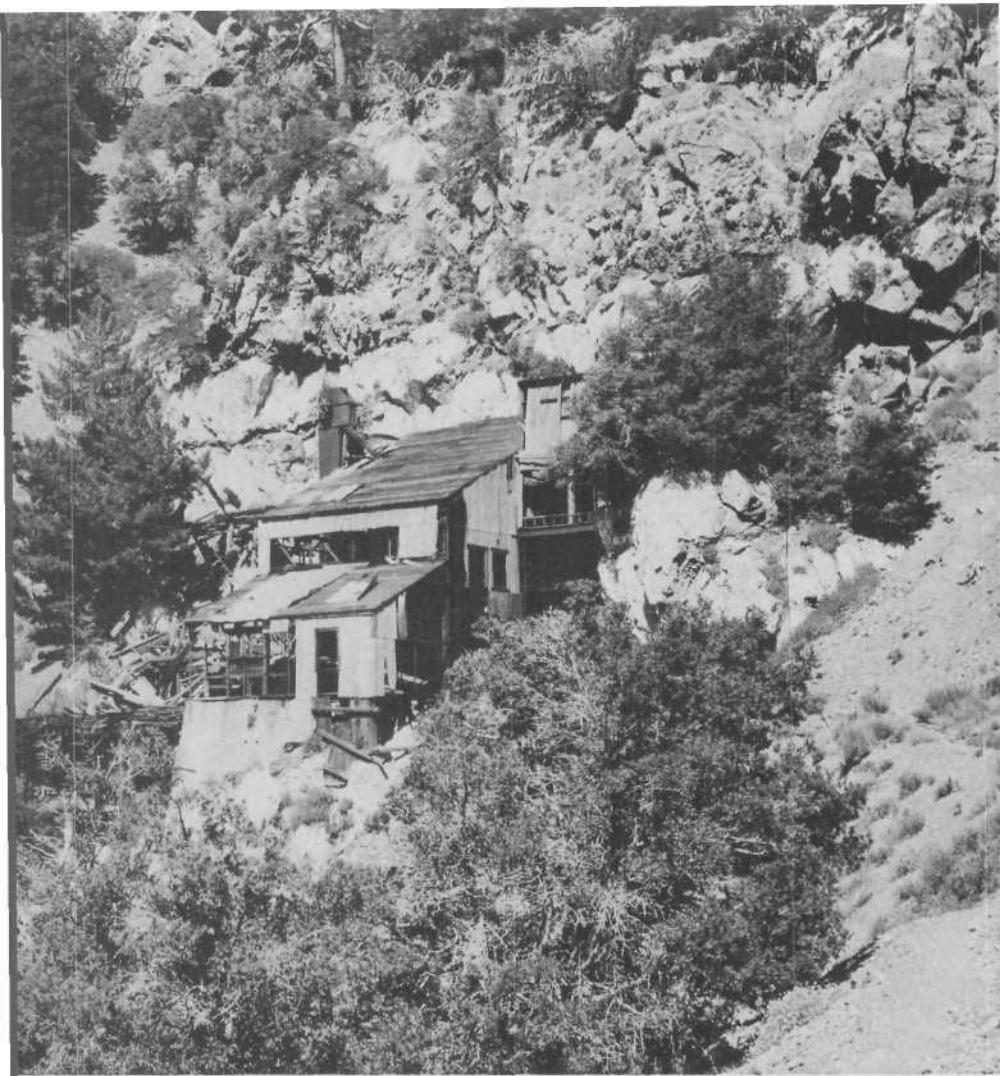
Here. Just a rock toss from Los Angeles. Here is where the fathers of Mission San Fernando mined the ore that provided them with gold with which they . . .

What did they do with it? Send it all back to Spain? Hide it? Bury it?

It is one of the San Gabriel mining secrets that probably will never be solved.

Let us enjoy the frustration.

And remember, the Monte Cristo, if you've a mind to poke in there, is private



One of the more remote
back country mines
and mills
in the
San Gabriel Mountains.

There is machinery, mining and milling. The balls still sit in the old ball mill. There are crucibles on the ground at the assay shed.

There are relics all over the place. A shaft, when filled with water during a recent rain, brought all manner of good, old bottles to the surface. When the water in the shaft goes down, the old bottles vanish again.

The person who discovered, or possibly rediscovered this old mine, has, sort of, in the back of his head, the possibility of protecting and preserving this site.

How it could be done remains beyond us all right now. It could be preserved and it should be preserved. All the rest of the area mines have been looted, vandalized, pot hunted and torn away.

It would be nice to save one.

So, until the plans are discussed and put together, and whatever is done that can be done, the site remains a secret.

Another secret.

I don't know where it is, and my informant won't tell me or mark it on a map, and I feel that it is important that he doesn't tell me.

I might make a conversational slip one day, and all those lovely crucibles and bottles and relics would end up in a private collection. They should belong to the people.

I know the site is very inaccessible, very difficult to get to, not on any trail, not visible from any trail, and not visible from the air. It is hidden, has been hidden, and will probably remain hidden for a long time.

So be it.

The San Gabriel Mountains are entitled to some of its secrets. Entitled to keep them that way. Secret.

I intend to keep looking, though.

Not for the Lost Padres nor the lost and buried saloon nor the lost mine with all the relics. I intend to keep looking for more stories, more tales of secrets in the range.

These I can collect and keep or share, and have the best kind of pleasure I know: the gathering of mountain secrets.

property, and the owners are of a mind, after many years of trespassers and pokers around, to poke you right out again.

San Antonio Canyon lies on the eastern edge of the San Gabriel Mountains. The area holds two of the best secrets of the range. One could easily be apocryphal. One definitely isn't.

One concerns a hiker in the 1960s who was off-trail, exploring the country somewhere east of the main canyon.

He fell into a hole.

He got out, went to a local ranger station and reported his accident. He told the rangers that he had fallen into an old building. In, through the roof. A building that had been covered over by a dirt slide. The San Antonio Canyon has had numerous slides in its time.

The hiker said that the room into which he had fallen, and from which he had climbed out, was a saloon. He said that the bar was in place, as were glasses and bottles. And drinkable liquor.

In the 1960s, bottle hunting was at its peak. Lots of people went looking for the buried saloon.

The tales one hears do not disclose much more. Where; did the hiker return and clean out the goodies, the valuables; did others find it; did it vanish like some many seen-one-time discoveries? No evidence.

It could be apocryphal.

But San Antonio Canyon did know an uncommon mining boom and lots of people and lots of drinking and lots of dirt slides.

So, you have a choice. Believe it, or file it and forget it.

The other tale is dramatically true.

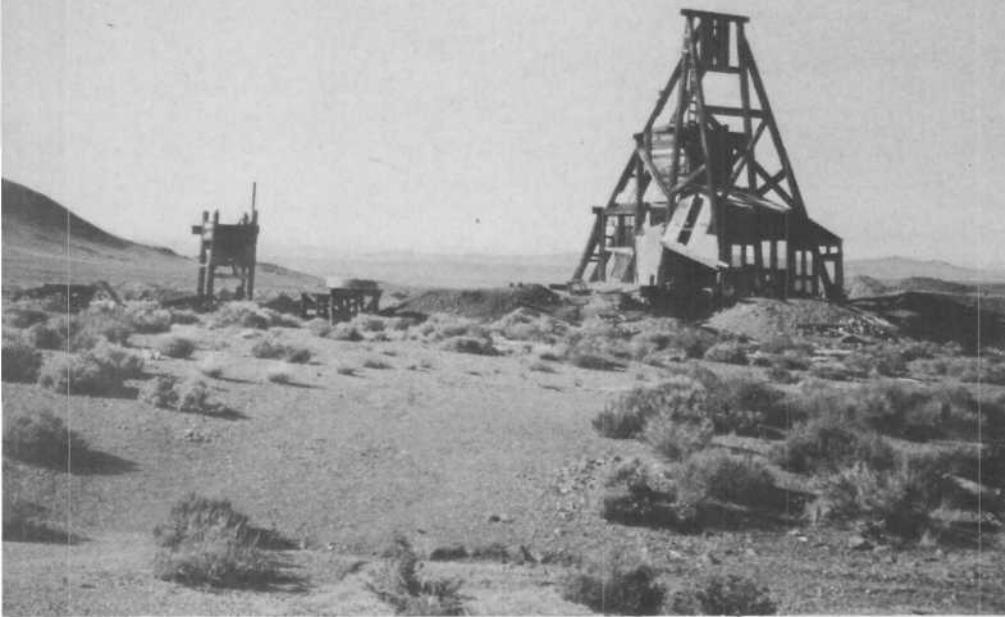
There is an old mine in the San Antonio Canyon area that was worked from the earliest days—the 1860s—to the most recent mining days—the 1930s. It is in a very inaccessible area.

It is hard to find, even if you know where to look, because it is grown over, hidden by brush, by chaparral and trees. It sits on a slope, so it was, and is, awkward to get to.

It had not been visited by more than a half dozen people since the 1930s, according to experts. It is unvandalized, unmolested.

Left: This headframe remains as a monument to a Golden Arrow miner's dream. Below: A light blanket of snow covers the ground at Silver Bow.

Opposite Page: The sage is slowly reclaiming Golden Arrow.



THE ONLY movement to be seen is rippling sage, blown by chill but gentle winds, the vapor trails of high-flying transcontinental jets, and an occasional jackrabbit darting across the old wagon road. This is the scene on a morning in late November, near the ghost town of Golden Arrow, Nevada — a far cry from what was experienced by the residents of that village shortly after the dawn of the 20th Century.

Golden Arrow is situated at a point about 13 miles south of a signposted junction on U.S. Highway 6, approximately 36 miles east of Tonopah, Nevada. At that point, a graded, but rather washboarded, dirt road heads south through a broad north-south valley, to the west of the mineral-laden Kawich Range. A two-track side road to the left, leading to Golden Arrow, is reached at a point 10.1 miles from Highway 6.

The remains of Golden Arrow are found on the western slope of the Kawich Range, at the southern base of a hill overlooking the broad expanse of Cactus Flats and the Nevada Test Site of the Atomic Energy Commission, to the southwest.

The first discovery of a valuable ledge in this district was made by the Page brothers, who were reportedly deaf and dumb, in August, 1905. The Pages located three claims, and sank a 20-foot hole, discovering a vein of gold four feet wide,

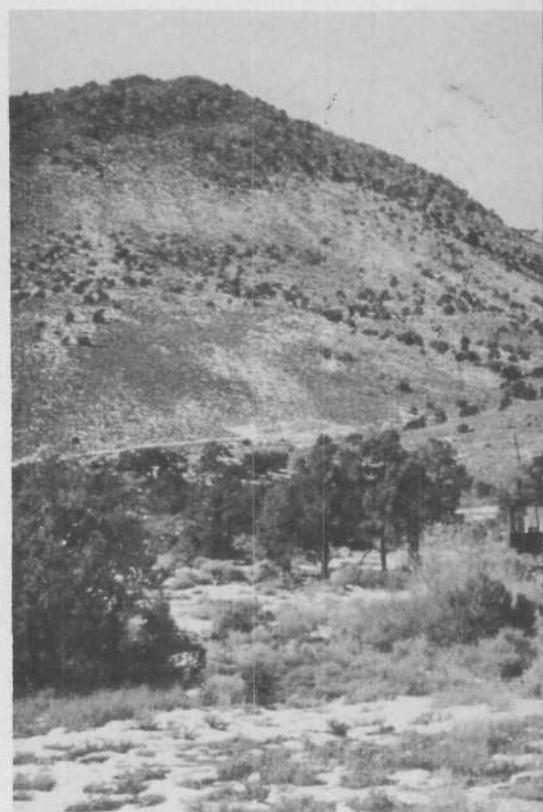
averaging \$120 to the ton. The brothers soon after sold their claims for \$45,000 to W. G. Cotter, who later became a major mine owner in the district.

When a townsite began to take shape, it was, as many Nevada towns of that period were, a tent city. Its original name was Longstreet, in honor of Jack Longstreet, a Nevada pioneer. By May of 1906, Golden Arrow was an active community, with a hotel crowded to full capacity, plus a number of stores and saloons. One million dollars in stock in the Golden Arrow Development Company was issued during that year, but production became erratic in 1907 and, 10 years thereafter, Golden Arrow was but a ghostly memory.

Today, the remnants of Golden Arrow consist of a few weathered wooden buildings, two shells of former concrete structures, and a gaunt mine headframe, silhouetted against the broad expanse of desert in the seemingly endless distance.

One thing striking about Golden Arrow, at least to this bottle-crazy writer, was the evident lack of digging by bottle hunters and the like. A town with saloons and plenty of thirsty miners surely had its share of beverage containers covered during the years since by desert storms and flash floods.

At the "center" of Golden Arrow, a faint two-track road heads east-north-



east, becoming more visible at the edge of town. This is the road to the other half of the ghostly "dynamic duo," Silver Bow. The road, for the most part, is fairly good, but somewhat high-center, and is passable for all but the most low slung passenger cars. At a point 6.7 miles from Golden Arrow, you will encounter the Tonopah-Silver Bow wagon road. That road was completed in September, 1905, at a total cost of \$427.05 (highway engineers of today, take note)!

Once you hit the Silver Bow road, it's only seven miles east to the townsite of Silver Bow over a fair, graded dirt road. Silver Bow is located in a canyon within the Kawich Range, at an elevation of 6,600 feet. It is surrounded by mountains on three sides, with the taller peaks capped with heavy snow during winter.

SILVER BOW AND GOLDEN ARROW

by Fred B. Nelson



The townsite itself is blanketed with light snow frequently between November and March.

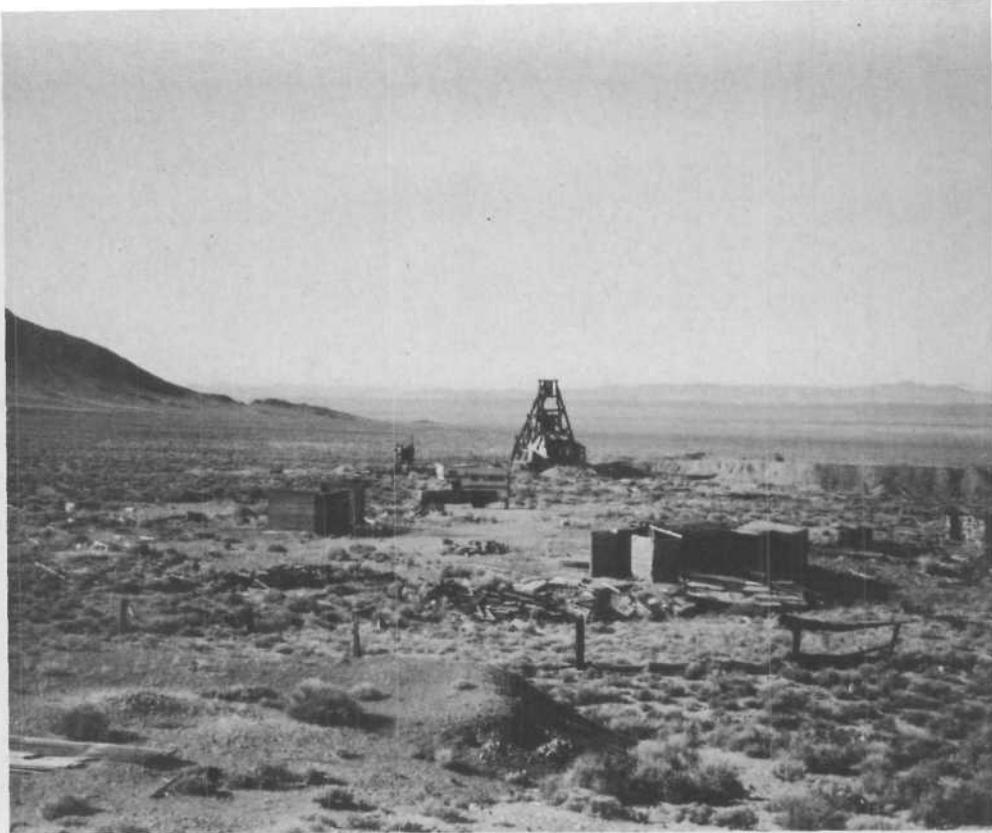
There is no great concentration of buildings in Silver Bow; rather, a number of structures are strung out through the canyon for a distance of about a half mile, and some buildings can be seen in side canyons beside mines operated by their former owners. The lower edge of the town borders on the Nevada Test Site, and visitors are not permitted beyond that point.

Silver Bow's discovery preceded that of Golden Arrow by about six months. Although the discoverer is not generally agreed upon, one report by the *Reno Gazette* in early 1905, and reprinted in the July 8, 1905 issue of the *Tonopah Bonanza*, credits the discovery to Prince Catlin



of Carson City, due to the following quote attributed to him: "It is true, I have struck it rich, I do believe. Of course, I cannot accomplish startling results unless I get capital to back me. I have a wide vein of ore with high silver values. The vein runs heavily in what is known as ruby quartz. The name of the mine is Silver Bow."

The backing to which Prince Catlin referred arrived in the summer of 1905, when famous Nevada mining promoters George Wingfield and Senator George Nixon laid out a townsite, at which time Silver Bow began its real growth. Being situated as it was, timber and water were available in such an abundant quantity that a fairly large population could be supported. By the end of the year, over 400 people called Silver Bow home, making it the largest town in eastern Nye County. The community contained numerous stores, saloons, a post office, and a



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newspaper, the *Standard*. One edition of the *Standard* is said to have had its front page printed with ink mixed with gold assaying \$80,000 to the ton!

However, ore gleaned from the canyons surrounding Silver Bow during 1905 generally assayed out at anywhere from \$100 to \$1,200 per ton, being about seven-tenths silver and three-tenths gold. The ore bore a marked resemblance to that which caused the stampede to Tonopah, five years earlier.

Silver Bow had its lawless element, too, and claim jumpers were a problem in particular. One instance involved two good friends who had begun an evening in a friendly discussion at a local watering place. The talk turned to argument, and finally erupted into a shooting match over who owned which claim. One of the men was lucky enough to emerge sole owner, and was later acquitted after pleading not guilty, by reason of self-defense.

Silver Bow began its decline in early 1906 upon the rush to the strike at Manhattan, to the north. Although a ten-stamp mill arrived by freighter from Goldfield in April, by the end of the year, the town was nearly deserted. Mining revivals in the next 15 years were attempted, but suffered the same fate.

Apparently there are those who still believe in Silver Bow's riches, as this writer found numerous assay sample packets showing test finds of "Au/Ag" (gold/silver), and dated August, 1971. These were found in a deserted cabin at the upper end of town.

Leaving Silver Bow, the shortest and easiest route back to Tonopah is by the old wagon road, west to its junction with the paved Nevada Test Site road, a distance of 20 miles. From there, it's 17 miles back to Highway 6, then another 12 miles west to Tonopah.

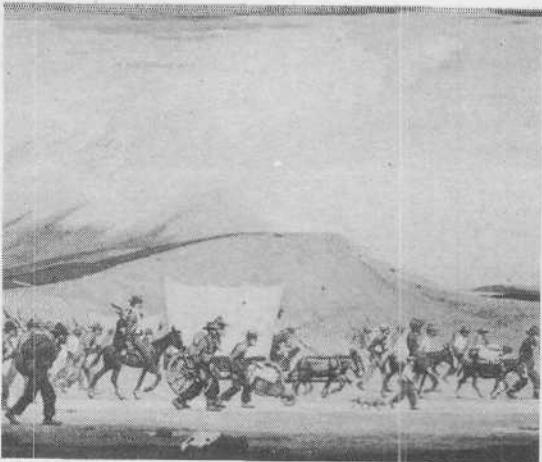
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The Ghost Town

Sculpture In

HAVE YOU ever seen a gnarled pine knot or a contorted oak root or trunk and imagined you could see in it some human or animal figure—perhaps an Indian squaw, a pudgy toad, or a horse in full gallop?

If so, you've probably dismissed the thought as foolish fancy, gone about your business and forgotten about it.

However, not so for Charley Miller, wood sculptor extraordinary, who resides at Julian in the manzanita, oak, and pine area of California's back-country San Diego County. To Charley, any old branch, root, burl, or knot—the more irregular the better—can be a dancing girl, a circus clown, a speeding roadrunner or a

gracefully swimming tropical fish. Charley works with simple tools (none of those fancy wood carving instruments); he uses a regular hunting knife for the rough work and an ordinary pocket knife for the finer detail. All of his creations develop naturally from the original contour and shape as found in the forest. The finished product must look like the raw material with just enough sculpturing to bring out the natural image.

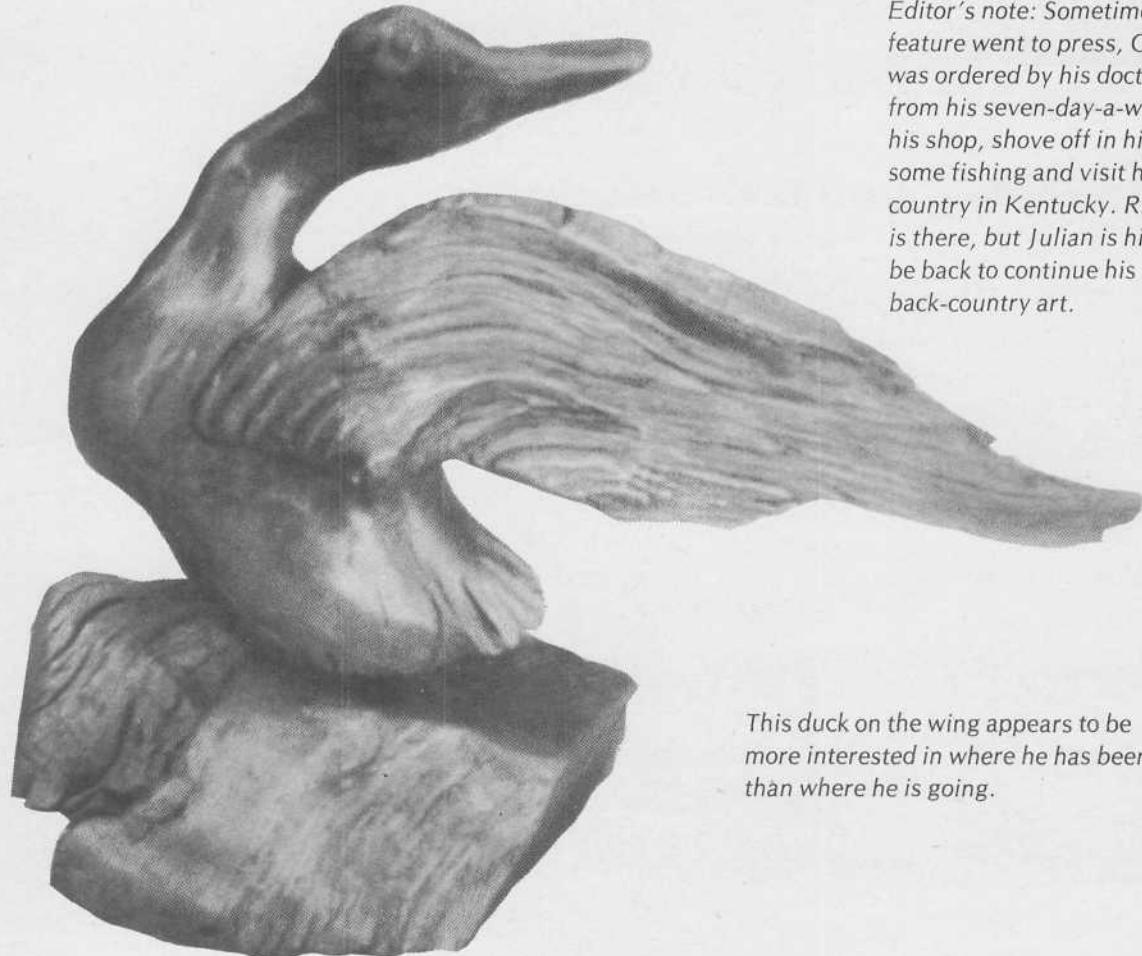
In fact, Charley comes by his talent naturally. He hails from an old family in Kentucky's Daniel Boone country and at about the age of five years, he received his first pocket knife. It wasn't long before he was helping his father make

furniture, wheel spokes, hammer handles and baskets.

So, the next time you pass through Julian, (or if you haven't visited this quaint gold rush town, make it the first time), stop and ask any of the town folk for Charley Miller. They'll direct you to his little bottle shop with the shelves literally lined with dozens of this sculptor's imaginative works of art.

You'll be glad you did, and whether or not you later take knife in hand yourself, you can be sure that the gnarled and contorted roots and burls which you see will take on a new character. □

Editor's note: Sometime before this feature went to press, Charley Miller was ordered by his doctor to take it easy from his seven-day-a-week occupation at his shop, shove off in his mobile unit, do some fishing and visit his old home country in Kentucky. Right now, Charley is there, but Julian is his home, and he'll be back to continue his unique form of back-country art.

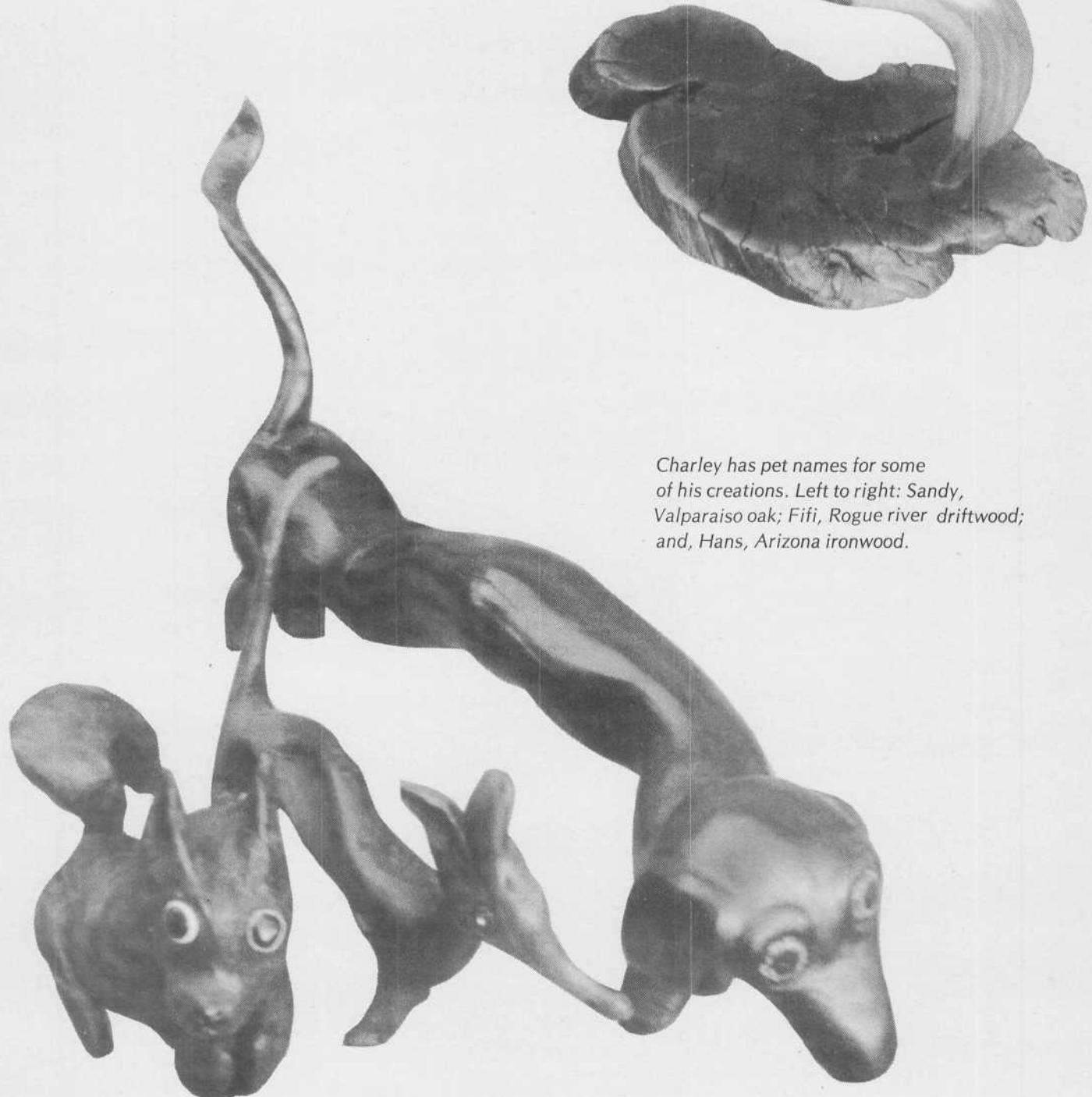


This duck on the wing appears to be more interested in where he has been than where he is going.

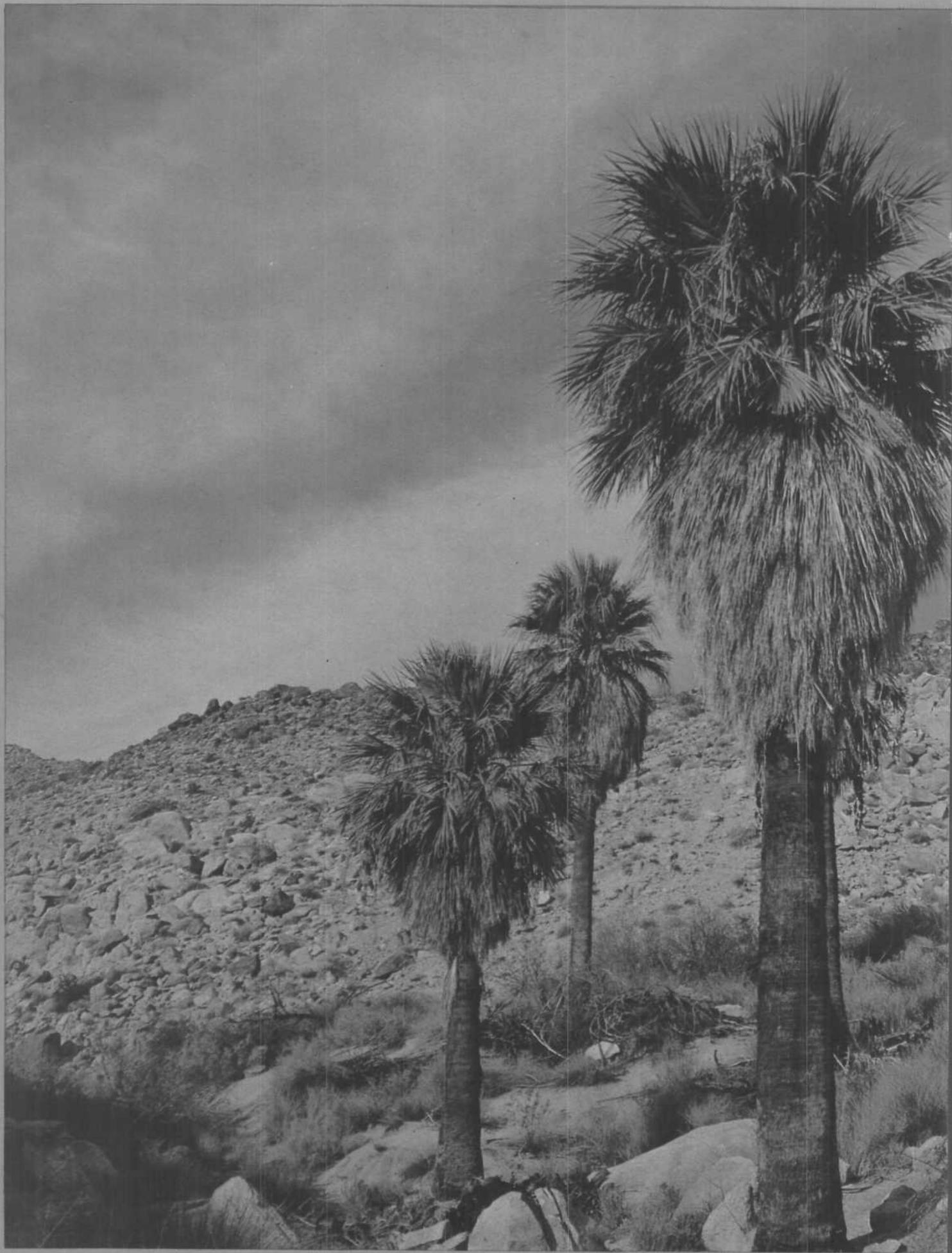
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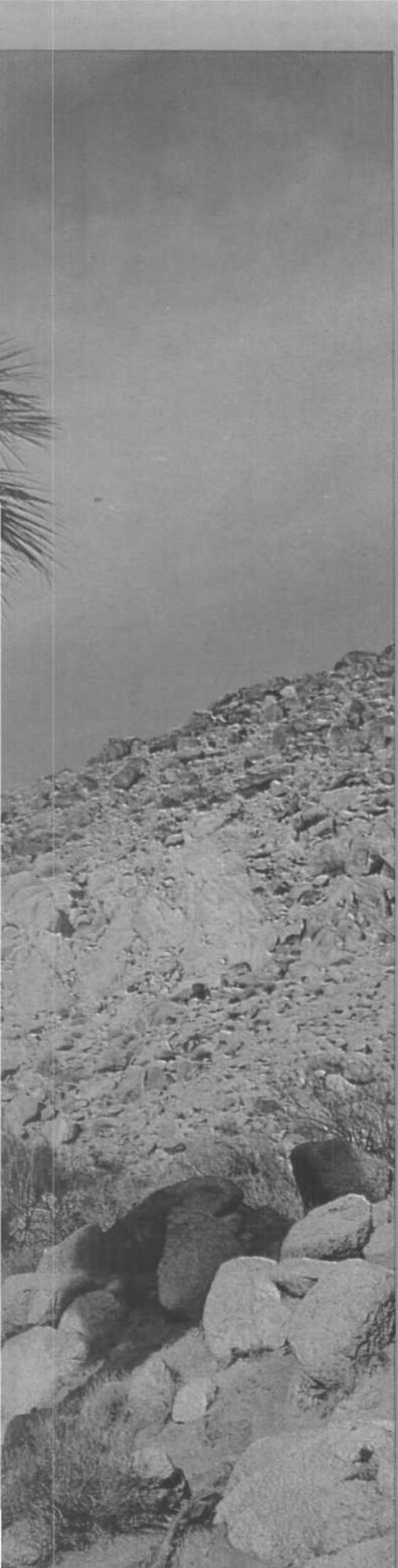
by Stan Sommerville

*The grace of this spirited horse
could well outdo the fame of Pegasus,
the flying horse of Greek mythology.*



*Charley has pet names for some
of his creations. Left to right: Sandy,
Valparaiso oak; Fifi, Rogue river driftwood;
and, Hans, Arizona ironwood.*





Indian Signs Along Carrizo Wash

by Dick Bloomquist

"CARRIZO"—THE very sound of the word embodies the spirit and texture of the Southwest. It is a commonplace name in the arid lands of Mexico and the United States, a name which fits its setting of sandy washes, sunshot canyons and peaceful oases like a glove. Carrizo means "reed grass" in Spanish; along moist arroyos, in the cienagas, and at springs and waterholes this tall, bamboo-like plant will be found growing in the manner of the desert palm—with its feet in water and its head in the sun.

In California, "Carrizo" is the name of several geographical features in the

Four shaggy-headed palms in the Carrizo Wash area. Color photo by Edward Neal.

southern corner of the Anza-Borrego Desert. Chief among these is Carrizo Wash, born amid the tumbled granite boulders of the Jacumba and n-Ko-Pah Mountains, where it is known as Carrizo Gorge and Carrizo Canyon. After reaching the desert floor near Bow Willow, it veers east to the Carrizo Stage Station site and the famed "Slot" between the Coyote and Fish Creek Mountains. Through this corridor came the Spaniard Pedro Fages in the late 1700s, followed by California-bound emigrants and the coaches of the Butterfield Line in the mid-19th Century.

Beyond the Slot, Carrizo Wash swings north around the Fish Creek Range into the deep desert, heading toward an eventual meeting with San Felipe Creek near the Salton Sea. It is here, along the sunrise side of the Fish Creeks, that the



This aboriginal stone circle rises only a few inches above the grip of the desert pavement on the west side of Carrizo Wash.

times, though, it can be soft with sand, particularly outside of the wheel tracks of previous travelers. Once I nearly became mired in mud a few days after a desert rainstorm. Most of the wash had dried out, but there were occasional stretches which appeared damp but firm. Just beneath the surface, however, lay a layer of ooze. Only by shifting to four-wheel-drive and backing up in my tracks, was I able to reach solid ground.

Carrizo Wash runs wide, shallow and open along the foot of the Fish Creek Range, with only a few smoke trees, desert willows and scattered tamarisks to mottle its smooth surface. A little over two miles upstream from the trestle I drew even with a low, rocky hillock, set slightly in front of the main mountain ridge. Practically bordering the wash on the west at this point is a sandy flat marbled with much pottery in red, brown and black; rock fragments showing human workmanship—possibly the remains of pounding tools—lie here and there amid the shards.

Beyond, closer to the hill, a weathered ring of stones is slowly returning to the desert from which its materials came. The enclosure consists of a single tier of approximately 50 stones and rises only a few inches above the grip of the desert pavement.

The aboriginal rock enclosures found in the Southwest, according to some archeologists, can be divided into two classes: sleeping circles and house rings. The sleeping circles, dating back possibly 10,000 years in some cases, served as shelters from the elements. Their builders, called "San Dieguitoans," since their culture was first studied along the San Dieguito River near San Diego, slept within these low enclosures. Much later, during historic and recent prehistoric times, Indians of the Yuman family, known as Kamias, or Eastern Dieguenos, occupied much of the Anza-Borrego Desert. They also left behind stone enclosures, but in this case, the rings served to anchor small brush dwellings. A door opening and the presence of Yuman pottery and other artifacts help distinguish this type of circle.

The apparent antiquity of the circle in

wash enters an undisturbed sector of the Borrego country rich in Indian prehistory.

This land is public domain, outside the Anza-Borrego Desert State Park, and may be reached from State Highway 78 on the north. One warm, bright February day, I turned off Highway 78 at Ocotillo Wells and drove south on the paved road leading to the United States Gypsum Company mine and nearby Split Mountain. After eight miles, I turned left on a dirt road which follows the gypsum company railroad east along the base of the Fish Creek Mountains. This narrow gauge railway—it is barely three feet wide—runs to Plaster City on Interstate 8 near the western edge of the Imperial Valley. Several times a day the silver-and-white trains, made up of diesel engines and about 20 cars, move quietly over their slender roadbed, which is ballasted in places with large chunks of gypsum.

The road varies in its condition, running wide and smooth in a few places, then becoming narrow and sandy, with occasional rough wash crossings. I have never had to shift to four-wheel-drive on it, but desert byways do change each year as wind and rain do their work, so the ideal vehicle for the trip would be something other than a low-slung passenger car.

After a little over two and one-half

miles, the road passes the first railway trestle. Soon, Superstition Mountain comes into view ahead and to the right. Petrified wood, concretions, Indian legends, and tales of lost mines season this drab-appearing desert ridge (see *Desert*, October, 1956). Farther along, at a point approximately six and one-half miles from the pavement, the beach line of vanished Lake Cahuilla stands out clearly on a spur of the Fish Creek Range a short distance to the right. This freshwater lake, formed by the waters of the Colorado River, once stretched from the Coachella Valley into Mexico; it dried up completely about five centuries ago.

Three and one-half miles beyond the beach line ridge (or a total of 10 miles from the pavement near the gypsum mine), the road dips into a broad, bare arroyo which the railway crosses via a trestle, its second. This is the storied Carrizo Wash which drains so much of the southern Anza-Borrego country. My course lay upstream (right) under the wooden trestle. (Turning left, the traveler will reach Harper's Well and San Felipe Creek near Highway 78.)

Again, a word of caution: the route up the wash is not a "road" in the formal sense of the word; the motorist merely follows the dry stream bed, which is normally smooth and well-packed. I have been up Carrizo when a passenger car could have negotiated it easily. At other

question here, plus its low relief and the lack of a door opening, leads me to believe it is an ancient sleeping circle of the San Dieguito people, rather than a house ring of the recent Yuman inhabitants. Of course, time may throw new light on the age and purpose of these still-mysterious enclosures of the Southwest. Possibly our conclusions are not final; perhaps, for example, the circles had a ceremonial value to their builders. But even though we may be ignorant of their true purpose, they still serve to enrich the present-day exploration of desert places.

Cutting between the stone circle and the knoll is a small arroyo, green with catclaw and desert lavender. Water may have surfaced here in earlier days when a wetter climate moistened the Carrizo country. I walked toward the mountains in the warmth and sunshine, following the nameless arroyo upstream. The month was February, but February is springtime in the low desert.

Sunflowers lent color to the land, along with Spanish needle, sand-verbenas, encelia and primrose. Creosote was in bloom everywhere, five-spot and poppies added dots of brilliance, while a solitary apricot mallow, three feet tall, brightened its rocky nook with dozens of red-orange blossoms. The faraway Chocolate and Orocopia Ranges stood out on their portion of the horizon and a spur of the Santa Rosas seemed propped against the northern sky. Closer at hand, the Superstition Hills and Superstition Mountain raised their pale ridges above the surrounding plain.

On the south side of the sheltered cove, drained by the wash, I came upon a deep mortero, or grinding hole, worn into a boulder. Two unbroken pestles rested on a nearby rock, and considerable pottery littered the ground in the vicinity. These artifacts, relatively fresh-appearing and similar to those found in Yuman camps elsewhere, are of Yuman origin.

I then climbed the low saddle immediately behind the site on the south. Signal Mountain, on the Mexican border, rose in the distance, while to its

right, the hump-backed Coyote Mountains dominated the skyline. But of greater interest were the two dim aboriginal trails visible below the saddle. These faint threads, left by vanished travelers, run along the foot of the Fish Creek Range only a few paces above the desert floor. This is typical trail country, for the Indian favored the middle ground for his routes of travel, avoiding sandy washes and canyon bottoms as well as the highest ridges.

Seeking out the old pathways is a rewarding pastime, since in the desert they have not been obscured by soil or vegetation and can sometimes be traced for long distances. Even when a trail is interrupted by a wash, it can frequently be picked up again beyond the break. These paths are usually dim and overlooked, but the shadows of early morning or late afternoon reveal them better than does the bright light of midday. When you are hiking along an Indian trail, the route immediately ahead often appears quite faint, while the distant sections stand out with greater clarity. Occasionally, you may lose the trail entirely, but aboriginal rock markers—sometimes just one stone on top of another—may indicate the correct route.

A helpful technique, when searching for Indian signs, is to walk a few paces, then stop and look about carefully in all directions. In this way, you will have a greater chance of locating trail markers,

potshards, and the many other relics of primitive cultures. The desert, harsh and devoid of interest to the casual visitor, becomes friendly and rich in detail when seen through sympathetic eyes.

It would have been enjoyable to follow the trails southward along the Fish Creek Mountains, but the sun was already low in the sky. I did find some pottery along the lower path, then turned back. It is certain that many more signs of Indian habitation await the explorer in this corner of the desert.

(Carrizo Wash can be driven for another five miles beyond this point to the well-posted boundary of the Carrizo Impact Area. Although abandoned, the Impact Area is still contaminated with unexploded ordnance and is therefore closed to the public.) The freedom and discovery offered by the still-virgin sectors of the desert are among its greatest rewards. But respect the land or more restrictions will be applied to back-country travel as the number of thoughtless visitors increases.

It was early evening as I hiked back to the truck. Superstition Mountain, across the way—dull tan in color earlier—now stood transfigured in luminous yellows and browns. A full moon rose in the east and the fragrance of verbena was in the air. The desert's fascination deepened with the twilight here along Carrizo Wash, the Indians' home of other days. □



Two unbroken pestles and a deep mortero may be seen in the sheltered cove behind the stone circle.

THE DESERT MINER

by K. L. Boynton

© 1974

The desert miner comes well prepared for work with an efficient set of tools.





Photos by Karen Fowler

LONG BEFORE the first prospector set foot on the land, the West had its miners—a four-footed, bewiskered lot who were hard at work better than 10 million years ago and whose descendants are still delving away in the desert today. These are the pocket gophers, a strange tribe of rodent vegetarians, burrowers by trade, and highly adapted for making a living in this most inhospitable land. They come in several styles, with many local variations on the theme, and their coat coloring tends to match the earth tones of their particular area.

The pocket gopher's mining operations actually consist of digging a vast underground burrow system made up of main tunnels, side tunnels, enlarged sleeping quarters, storage chambers and latrines. The excavated earth is shoved out and dumped as work progresses, becoming the characteristic mounds that indicate gopher whereabouts, and from whence cometh their family's scientific

name, Geomyidae, meaning earth rodent.

Each adult gopher has his or her own burrow system in which each resides in solitary splendor. Not only is this home sweet home, it is also where food is to be secured. The burrow is, in short, home range and territory, and as such it is vigorously defended. Digging goes on practically all the time, for the job is never done. Tunnels are constantly being extended in search of food as pocket gophers dine on roots and tubers, bulbs and the like encountered underground. They also like topside vegetation, and digging a brand new extension off the main tunnel is the best way to get to a new grocery area without being exposed to enemies enroute.

Naturally enough, to do all this digging the pocket gopher has to have the proper equipment and here, let it be said, of all hole-dwelling rodents, he has the very best. His body is short and stout, sturdily built; his shoulders broad,

and he has hardly any neck at all. His head is extra large, with thicker and more rigid skull bones. Attached to it are masses of muscles which have to do with the operation of his outsized front gnawing teeth, which he uses as picks, chisels and pry bars in his digging. His front legs are big and strongly muscled for powerful digging strokes, his paws provided with very long claws. Dirt is kept out of his eyes by protective eyelashes and tightly fitting lids with extra large tear glands to wash them clean. Valves close up his ears, and the dirt excavated by his big teeth can't get into his mouth, since his furry lips fold around and fit up behind them, making a neat closure.

Biologist W. J. Breckenridge, interested in seeing how the gopher did his mining, built a glass observation box, filled it with dirt and took a front seat at what proved to be a most remarkable performance. The gopher, it seems, goes at his digging with dash and style. Brac-

ing himself with his hind feet, he slaps his big front teeth into the soil, gouging and loosening it up, his big clawed front feet taking over immediately with powerful alternate strokes to sweep the soil downward and backward under his body. The accumulating heap is kicked on back and when it begins to pile up, the gopher stops digging and proceeds to perform the impossible: he turns around in a passageway too narrow and too low to do it in, by some slight-of-whisker trick that looks like a somersault. With the dirt pile now ahead of him, he spreads out his front paws, puts his chin down on the pile, and shoving with paws, shoulders, head, body and hind feet, makes a bulldozer out of himself. The dirt is pushed along ahead of him and out the entrance, thus making the characteristic mound at the surface.

No gopher in his right mind is going to leave a door open. When it is time to shut it, he pushes a dirt pile forward into position. Then, putting his weight onto his front paws and bouncing up and down on the pile, he rams the dirt plug into place, closing the hole up tight from the inside.

With all this constant mining and cutting of tough roots for food, to say nothing

of fighting, there is bound to be a tremendous amount of wear and tear on the gopher's big front teeth. Now, rodent incisors grow continuously, replacing wear and keeping their chisel-shape. So Zoologists Walter Howard and Melvin Smith suspected that those of the pocket gophers must grow a lot more than those of other gnawing rodents, since they use theirs so much harder. To check on this theory, they put a small dental notch on the teeth near the gums and then added notches as needed, taking frequent measurements. They came up with the astonishing figure of 8.91 inches of growth per year for the upper front teeth, and a whopping 14.9 per year for the lower ones. The total for all four gopher teeth was 225 percent higher than comparable tooth growth in the domestic rabbit, and 370 percent bigger than that of the porcupine, both animals being first class gnawers themselves.

Why the lower teeth should grow even faster than the upper ones, which look as though they catch most of the hard work, is not known. To be sure, the working lower jaw moves, the upper one being stationary since it is part of the skull. the lower teeth have more leverage and greater abrasion. They are longer, too, and straighter, and separated slightly and therefore they chip and break easier. Perhaps the faster growth rate may also have something to do with the way the upper and lower teeth rub together.

Since they also work hard, the big claw-nails on the gopher's paws are subjected to extra wear and tear and Howard's subsequent notch test of them proved that the longest ones on the middle three fingers, which take the worst of it, grow some three and one-half

inches a year, a rate about twice that of the other two nails.

Like all good workmen, the gopher keeps his tools in order, cleaning his big teeth with the claws of one hand steadied with the other. Zoologist Terry Vaughan, listening to the loud scratching and clicking noises that accompanied these dental ablutions, and noting the head bobbing and vigorous attack, concluded that a very thorough job was being done, particularly since the claws themselves were then picked neatly clean with the teeth, stray bits of debris being ejected.

The gopher also likes his comfort, his bedchambers being furnished with soft grasses from topside, his food lockers well stocked with supplies, all lugged home in his built-in satchels. These are enormous fur-lined pouches located on the outside of his head. One is on each side, opening with a slit at the angle of his jaw and extending back to his shoulders. Bag-like, they are capable of great distension. Cargoes are loaded with surprising speed, the gopher's hand stuffing and wadding the material in, for time outside the burrow, even a few inches from a mound entrance, can be exceedingly dangerous. There is always bound to be some hawk, coyote, snake, owl or wildcat on grocery patrol most of the time, or worst of all, a badger, who is a lightning-fast digger himself.

Safely back inside, with the door plugged, the gopher unloads his pouches with swift movements of his paws, turning the empty sacks inside out finally for cleaning. Working carefully with his claws, he combs and neatens up their furry lining, licking and smoothing it, and finally leaving the bags open for a time to dry.

Since about 99 percent of his life is centered in his burrow, the gopher's notoriously inhospitable attitude, and downright anti-social point of view, is understandable, particularly when his long evolutionary isolation is considered. Biologist Robert Russell, working with gophers in Texas and the desert regions of Mexico, could plainly see how fossorial annimals such as these, who depend on underground roots for food, supplemented by what poor plant supplies were available on the surface, would have to be highly competitive to live. Selection, operating down through the evolutionary ages, would result in intolerance of others as a necessity for

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survival. All of which explains why, when you put two pocket gophers together, one is shortly going to be very dead, but not without wreaking a lot of damage on the other.

Nor can the gopher help being so pugnacious, apparently for physiologically he gets an extra supply of adrenaline pumped into him by his adrenal glands. Located near the kidneys, these glands have long been known to anatomists as the suppliers of hormones which, working with the sympathetic nervous system, whip up the animal body (including man's) to action, putting heart, muscles and all reactions into top operating condition for fighting or fleeing. In fact, biologists Richard Rudd and David Mullen, after a lot of behavior testing with numerous gophers and anatomical study of their interiors, reached the conclusion that these animals depend upon this adrenal governed antagonism, reinforced by life-style isolation to maintain their territory, and hence survive.

But the tribe must increase, to be sure, and so at the proper time of year, depending on where they reside, gopher territory maintenance takes a temporary back seat to reproductive urge. Plural occupancy is now the thing, the scientific team of Hegdal, Ward, Johnson and Tietjen, for instance, finding that 75 percent of the burrows around Carlsbad, New Mexico had more than one gopher in it. Mostly it was a female with young, sometimes apparently a honeymooning couple—a thing unheard of other times of the year when a lady resident is anything but ladylike in her slashing attack on gopher callers. With the dispersal of the young, who in time go off to dig their own burrows, the old status quo returns. Welcome mats are jerked in, and everybody becomes their old rude selves again, with single occupancy once more the rule.

That is, single as far as gophers are concerned. However, like most hard working characters, they have their free-loaders.

Terry Vaughan, investigating burrows in Colorado sandhills, found that of 22 kinds of animals in the area, 68 percent regularly inhabited occupied or abandoned gopher holes. These included the desert cottontail, rattlesnakes, spadefoot toads, six-lined racerunners, deer mice, burrowing owls, to mention only a few. The tiger salamander is even more de-

pendent, being unable to survive in this dry, arid region without the cool home of the gopher. Pondering all this, Vaughan could see that the extensive burrow system and large quantities of soil pushed to the surface had a marked effect both on local conditions and on other wildlife citizenry dwelling in the environs.

Indeed, the gopher is a record earthmover, as Zoologist Voit Richens found when he turned one loose in October in his garden near Logan, Utah. Here, the soil was compact clay loam, and in 15 minutes the gopher had a tunnel 18 inches long. Richens started his record keeping right there, ending it when the gopher turned up defunct in February. During this time, the animal had dug 480 feet of feeding tunnels alone, in spite of the fact that the ground was frozen for two months. The deeper tunnels, where the nest chamber and toilet would be located, were not investigated, but mounds were everywhere showing that much digging had been done. Richens air-dried and weighed the dirt in the mounds and found that the gopher had removed some 1062 pounds of dirt in five months.

Based on this exploit, he figured that 30 of these gophers per acre (a reasonable population in good digging terrain) would move over 38 tons per acre per year. This, along with Zoologist Aldous' modest report of five tons per acre per year, for a small population residing in a dry section of central Utah, goes to show that gophers are, in truth, prodigious soil movers, good circumstances or bad.

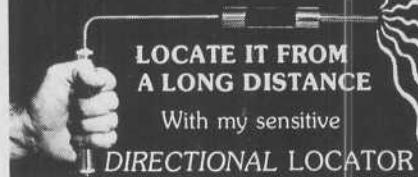
Hence, many scientists regard these fat-faced little diggers as soil makers deluxe. Their mining operations bring raw earth to the surface to weather and release the minerals that plants require. And their burrows catch water, holding

it from fast run-off. The gophers store more vegetable food than is finally eaten, and this, in rotting, creates needed humus. Even their latrines contribute needed nitrogen. Ecologists R. M. Hansen and M. J. Morris found that in Colorado the most luxuriant growth of plants on uncultivated land was where gophers were common, and that range land improvement there was largely due to their mixing of the soil, helping the infiltration of water, and aeration.

They also noted that the gophers consistently selected gravel-sized rocks and moved them up to the surface, thus also speeding the decomposition of rocky material. From this they concluded that further study might prove that well-developed mountain soil, for instance, that lacked gravel-sized rocks, but contained numerous larger-sized ones, could very well be soils that had been subjected to beneficial gopher influence for thousands of years.

The desert is particularly in need of all the help it can get to keep its plant life going. Gophers, living in their little "islands of favorable soil, surrounded by seas of unfavorable or downright uninhabitable terrain," as Russell neatly put it, are working, well . . . like gophers . . . to keep the desert alive and beautiful. □

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Metal Detecting ...

by
Bill Knyvett

A

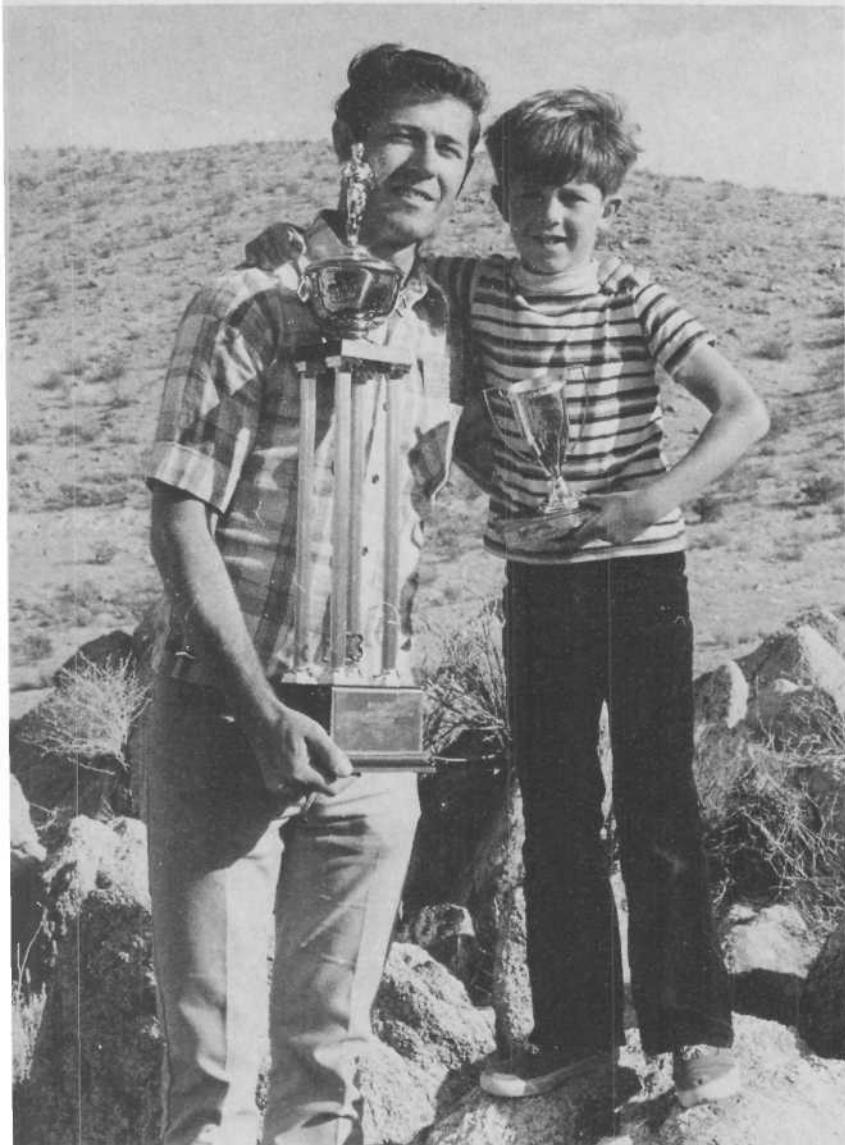


Photo by Jack Pepper

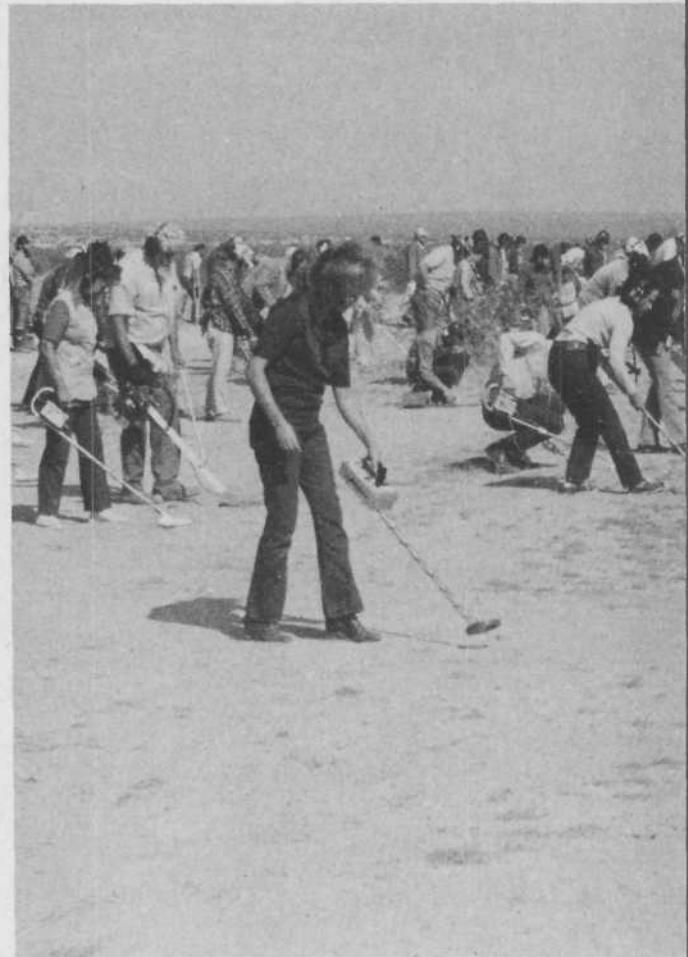


Photo by Herb Polson



Above left: Eleven-year-old Steven Pepper wasn't going to let his father, Don Pepper, win the only trophy. Steven placed second place in the junior contest, while Dad came in second in the adult competition. Above: The search is on! Left: Treasure hunt, junior division. Right: Placer gold prospectors of the future were given expert advice on how to handle a gold pan by Murray Hirata, world champion gold panner.

Hobby to Treasure!



Photo by Jack Pepper



Photo by Jack Pepper

THE DICTIONARY defines "hobby" as "a subject or pursuit of absorbing interest, undertaken primarily for pleasure during one's leisure time."

Metal detecting is fast becoming one of America's favorite hobbies. Given the mildness of the Southwest's climate, it can be a year-round pleasure search that more often than not turns up items of some worth that can make the hobby self-supporting.

It has few equals as a family hobby, and with all members having their own detector, it offers a great opportunity for competitive fun. Each outing, whether to a beach, park or ghost town, turns into a miniature treasure hunt with the anticipation of a "find" urging one on.

Some hobbyists band together and form clubs and associations. One such typical group is the Prospectors Club of Southern California which has some 700 members. The highlight of the club's activities is their annual Convention which is one big round of fun. Men, women and children all get a chance to prove their mettle with metal detectors.

Pictured on these pages are scenes from their most recent event and it appears that the hobby paid off some pretty fine dividends in the form of merchandise prizes.

Five thousand happy hunters gathered in Galileo Park, near California City, and had a great time meeting and talking to manufacturers and their representatives. The Convention is an excellent showcase for all the new models and is really an eye-opener to anyone who has never seen a detector operated efficiently.

Armed with a retrieving tool, varying from a garden trowel, screwdriver or ice pick to a professionally designed job, and an apron to place the coins in, the

entrants all stand in a line awaiting the starting gun. In front of them, several acres of desert have been "planted" with coins.

Everyone has their own style; some use the earphones, others hang the phones around their neck, with the volume turned up full. Almost all use a sweeping motion, moving quite rapidly, sensitive to any change in tone or needle. Once this occurs, they drop to one knee and quickly locate the coin with their probe. The rules state that you must cover up the hole after you have retrieved the coin.

The action is fast and although the machines are lightweight, it is a bit of a workout if you're to finish among the top echelon.

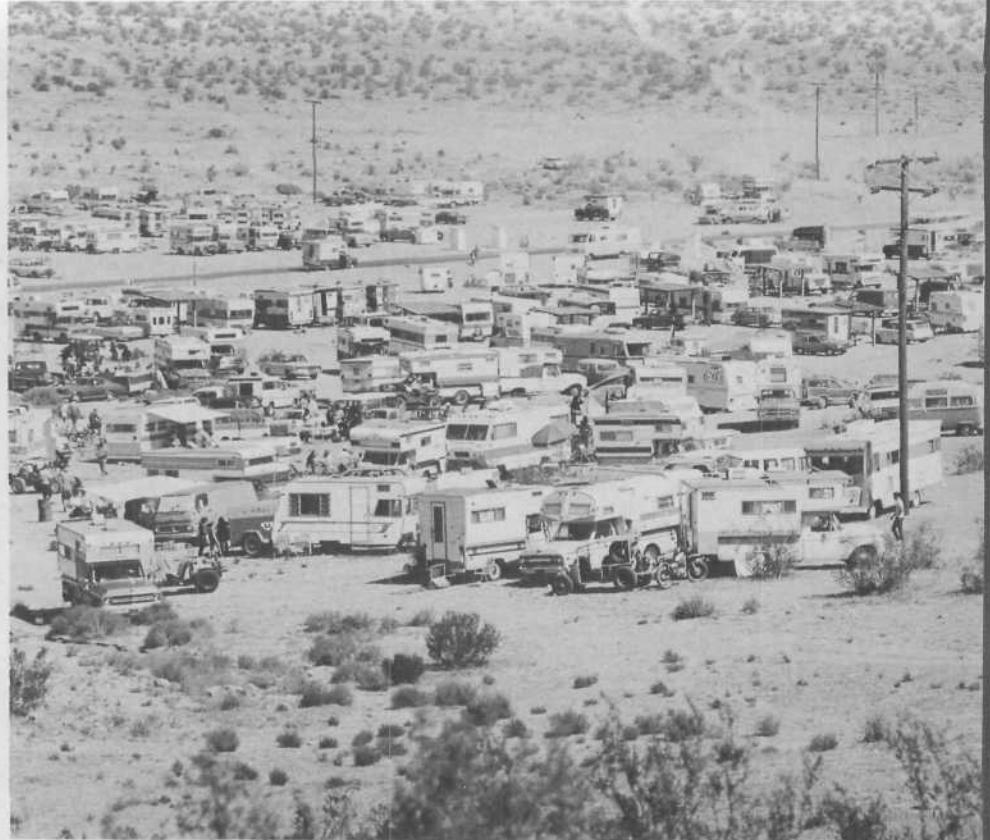
The manufacturers are generous and detectors are awarded to the high finishers in all categories, proving that metal detecting is, indeed, a hobby to treasure. □

Above: a small portion of the campground, packed with vehicles of every description

Right: A group of youngsters await the start of the junior hunt.

Below right: Prize winners in the women's division, left to right, Kay Modgling, third place; Ann Hamilton, second place; and Mary Masters, first place winner.

Below left: Men's winners, left to right, Roy Roush, winner; Don Pepper, second place; Harold Coots, third place; and Dean Chapman, fourth place, all with their trophies and prizes.



Photos by Herb Polson





"GERONIMO'S coming!!!"

Two words that never failed to instill panic in the hearts of men, women and children throughout Southern Arizona Territory during the 70s and 80s.

Rape, torture, massacre always followed in the wake of this infamous Apache chief. He was absolutely merciless in his treatment of captives.

There are those who claim Geronimo's terrible vindictiveness toward mankind is understandable, although none will attempt to justify it. His wife and children were murdered by Mexicans and from that day on the young Indian dedicated his life to revenge. Brilliant, bold and courageous, he became the Apache war chief and led endless raids into Mexico and his home territory of Arizona.

It was the Mexican soldiers who dubbed him 'Geronimo' (Her-ON-er-mo). Possibly they took it from their verb *germinar* (her-me-NAR) meaning 'to sprout' because he would appear so suddenly and unexpectedly.

As soon as the Apaches sensed the terror this nickname inspired, they used it as their war cry. They'd dash into a settlement, or attach a wagon train, screaming, "GERONIMO! GERONIMO!" Eventually, the Indians themselves began to call their chief 'Geronimo' and so, in time, his true name of Gokliva was forgotten.

Although the Marines had nothing to do with the Apache War, they also chose the word 'Geronimo' as their battle cry. Thus, ironically, the American Indian name heard most frequently around the

world is that of a cruel war chief who ruled a small Apache tribe of Bedonkohes in Arizona.

And, oddly enough, a strikingly effective monument has been erected in Geronimo's memory. It stands in splendid isolation at a wayside Rest Area on Highway U.S. 80, within 10 miles of the New Mexico line and even closer to Old Mexico. There is nothing around but space and scenery.

But this pillar which perpetuates the Apache war chief's name commemorates—not his victory—but his capture. It towers 25 feet high to remind each new generation of that historic day, Sept. 5th, 1866, when Lieutenant Gatewood marched, alone and unarmed, into this Redman's camp at Skeleton Canyon on the Mexican Border and talked him into surrender.

Geronimo spent two years at Ft. Pickens, Florida, six years at Ft. Marion and in 1894 was moved to Ft. Sill, Oklahoma where he remained until his death in 1909.

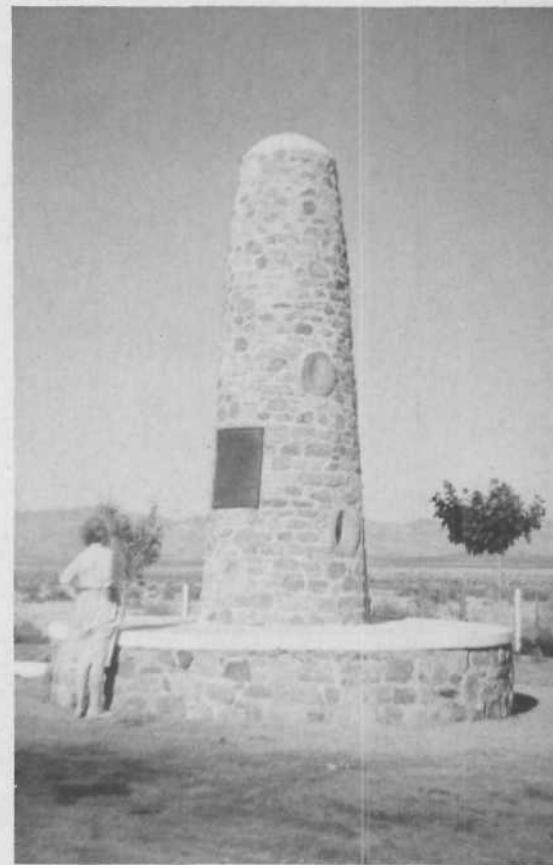
A stop at Geronimo Surrender Monument is well worth while. There is a plaque to read and a pleasant covered picnic area for lunch or a coffee break. The view is superb with rolling grass-

lands and grazing Hereford cattle. Impressive mountain ranges of two states and a foreign country can be seen stretching high against a deep blue sky. Here, the air is so clear cowboys claim they can spot a pretty girl's wink a mile away.

And the silence is so profound that if you remain perfectly quiet you're very liable to hear the echo of Indian pony hoof-beats in Skeleton Canyon and the blood-tingling cry, "Geronimo!" □

Monument to Surrender

by Phyllis Heald



The monument to surrender, with its inscribed plaque, stands under the desert sky near Old Mexico.

TRADE BEADS OF THE NORTHWEST

Continued from Page 15

and continuing for more than two centuries. Many different Spanish expeditions spread trade beads throughout the Southwest and well north into California. Although the Russians were moving into the Aleutian Islands and, in fact, one expedition, that of Bering, in 1741, had reached the mainland of Alaska near Cross Sound, it was the Spanish who were first to reach the far northwest and conduct a trading expedition.

In 1774, Juan Peres, commanding a ship sent from Mexico, explored the Northwest Coast, reaching as far north as the Queen Charlotte Islands, the land of the warlike Haida Indian. Then, turning back south, he landed at Nootka where he stayed a short time trading with the Indians. There is little doubt that the glass bead was one of the trade items and, if so, they would have been the first glass beads to have reached that area.

In 1775, two more Spanish ships ven-

tured as far north as Alaska where the commander of the expedition, Bodega y Quadra, landed to trade with the Indians, and at which time he took possession of the land in the name of Spain. However, a short time later, outside pressures caused the Spanish to relinquish their claim to the area.

There were three main routes by which the glass trade beads reached their focal points of distribution. The first was by way of Santa Fe, New Mexico, where the Spanish were the power to be reckoned with. Supplied by way of Mexico, Spanish conquerors, explorers and religious specialists were almost exclusively responsible for the distribution of glass trade beads throughout the southwest and at least as far north as northeastern Utah and northwestern Colorado where trade items peculiar to the Spanish southwestern trading system are found. The connecting link to this fact lies possibly in the inter-tribal relations that existed between the different factions of the Ute nation. The south-

ern Utes, whose natural area of habitation was in parts of northern New Mexico, would have had access to Spanish trade goods and could have distributed them through inter-tribal exchange throughout the areas that were under their control.

An alternative source of supply may have been through the numerous Spanish and Mexican trading expeditions that are known to have ventured into Ute territory after the expedition in 1776, of the Franciscan friar, Silvestre Veles de Escalante. In 1813, Mauricio Arze and Legoa Garcia made one such trading venture into Ute territory and from that time on, Spanish and Mexicans carried on a continuous trading relationship with the Ute Indians up until the time of the arrival of the Mormon settlers who promptly put a stop to the practice as it involved a traffic in human lives.

In view of these facts, it then is possible that Spanish and Mexican trading expeditions may have been, "in the main," responsible for the glass beads

Figure 58-A

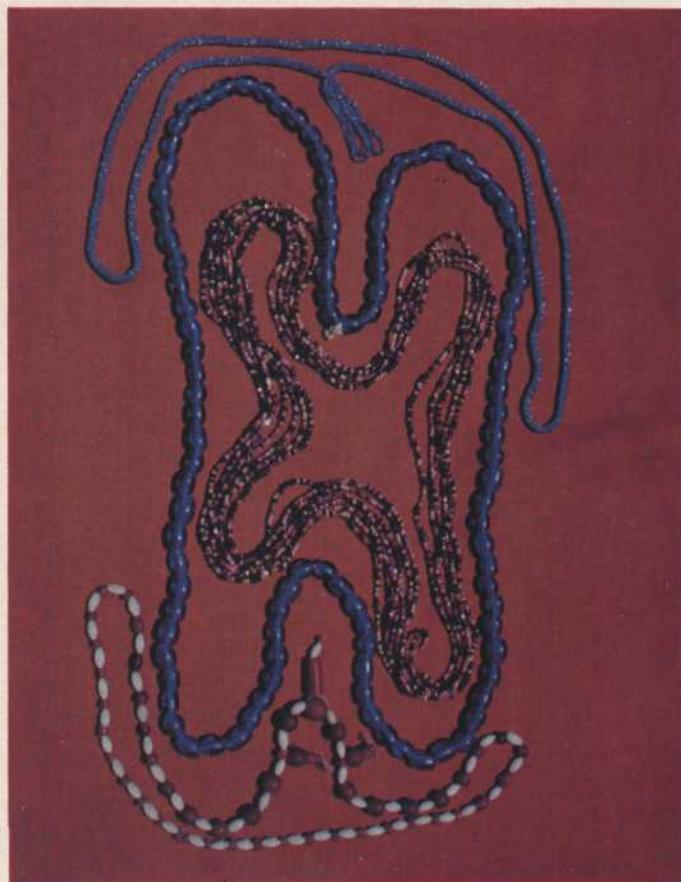
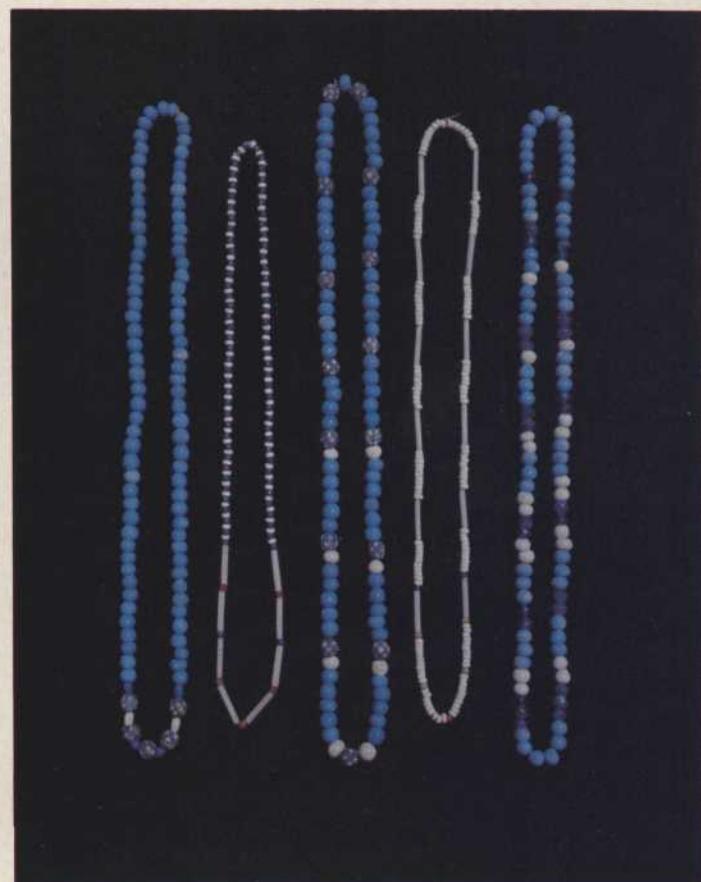


Figure 54-A



and other trade items that are found within the locations mentioned before. Be that as it may, the fact is that mandrel wound Padre beads, Venetian beads, prehistoric Mimbres disc beads, solid brass bells, Spanish bridal bits, silver and brass bracelets and other items that are clearly of Spanish origin, are found within the areas formerly occupied by the Northern Ute Indians. In *Figure 54-A*, beads of the above-mentioned varieties can be noted.

The year 1778 was the time when the value of the sea otter pelt was discovered. The English trading ships, the *Resolution* and the *Discovery*, under the command of Captain James Cook, visited the Northwest Coast and traded extensively with the coastal Indians. At this time, he acquired a number of sea otter furs and when his ships reached China, it was discovered that these furs could be sold for very high prices. Consequently, when this news reached Europe, ships of many nations rushed to the Northwest Coast laden with items of trade such as glass beads, guns, rum, metals and trinkets.

The luxurious sea otter furs were the most desired article that was to be obtained from the natives and were pur-

sued with such vigor that this wonderful little animal was very nearly exterminated. Their furs were taken to China and exchanged for porcelain, tea, spices and silk as cargo for the voyage home.

At first, the English dominated the area, but Spanish, French, Russians and the Americans, known as "Boston men," were also present, vieing for their share of the business. This caused the traders to revise their methods of operation, resulting in the establishment of trading posts at advantageous points from which the fur harvest of the Indians could be obtained almost before the pelts were dry.

In 1793, Russian traders had established bases at Sitka and Kodiak, and it seems likely that it was from these two places that the "Russian cut," or faceted beads, acquired their name. This type of bead eventually spread as far south as northern California, but it is doubtful that the Russians were the only ones to have had this type of bead as they are too numerous along the West Coast to account for the volume of trade that was done by the Russians alone. Also, there is no record of the Russians making trade beads, but it is a known fact that

this type of bead was made in Europe. *Figure 56-A* shows several strings of these beads in colors of blue, green, amber, white, black and garnet. Some of these beads show so much wear that the facets are almost indistinguishable.

In 1805, the Northwest Company established trading posts at strategic points in the interior areas of the far northwest, making trade beads and other items readily available to the natives of that area, but extreme competition made it advisable for them to consolidate with the Hudson's Bay Company who had established their headquarters at Fort Vancouver on the Columbia River, a most advantageous place from which to dominate the fur trade of the Columbia River basin and all of its tributaries.

Not until 1849, when the Americans validated their claim to the Columbia River area, did the Hudson's Bay Company leave, moving their headquarters to Fort Victoria and leaving behind only the trade goods that had made them fortunes, among which there was a distinctive bead that bears their name, the Corinaline d' Aleppo, or Hudson's Bay bead. The earliest version of this bead had a

Figure 59-A

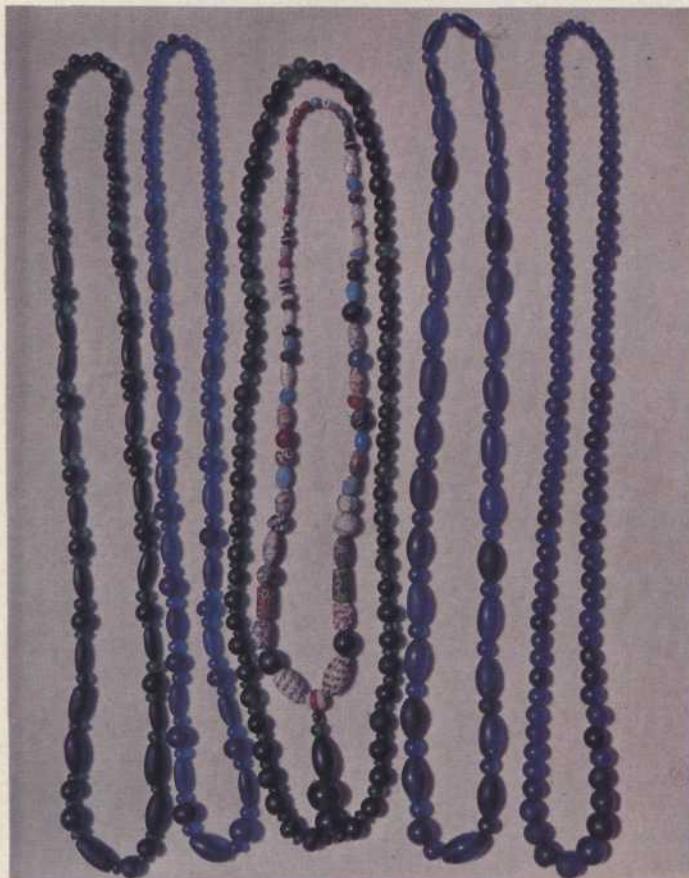
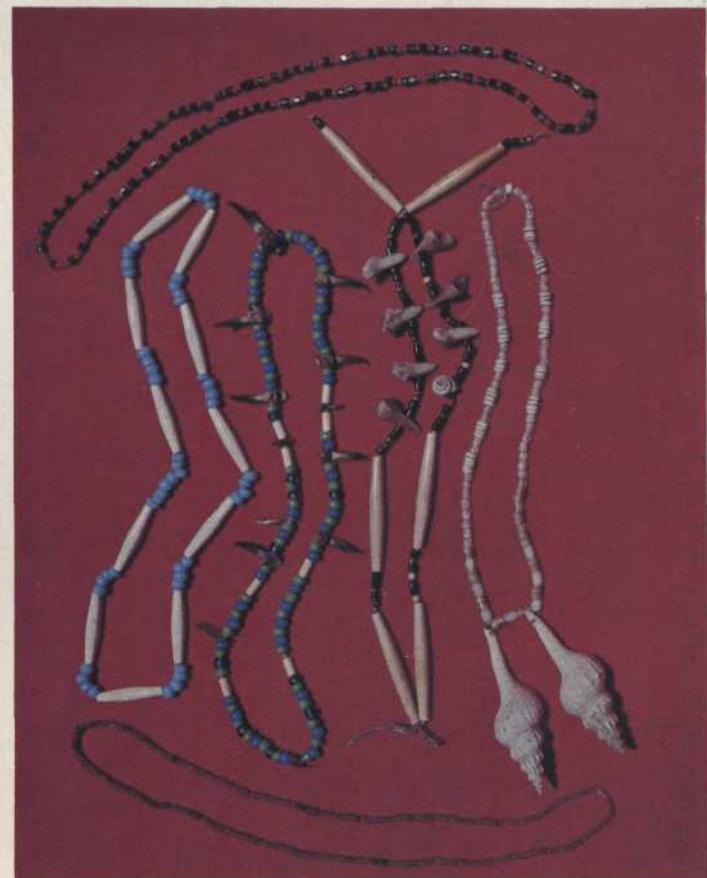


Figure 57-A



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brick red exterior and a green interior, which to the casual observer appears to be black. However, when held to a light, it proves to be a dark green. During the early 1800s, another version appeared. These beads have a bright red exterior and a brilliant interior which is usually yellow or white, but occasionally pink. This later version was a much more attractive bead and came in a great number of sizes and shapes, varying from tiny seed beads to some that were up to an inch in length and a half-inch in diameter. In *Figure 51-A*, the early version of the Cornaline d' Aleppo is shown in the center of the picture. Also rolled copper, round brass and barley seed beads of white and blue are to be seen in some of the other strings. The others shown are combinations of various other Northwestern trade beads.

In *Figure 58-A*, the later version of the Cornaline d' Aleppo beads can be seen separated by white barley seed beads. In this string, there are beads present that have both white and yellow centers. Also shown are Siletz Cobalt Blue beads, Nez Perce multi-colored beads and Umpqua rope woven beads. *Figure 57-A* shows from left to right Flathead disc beads with two large shells acting as pendants, the center two strings are Blackfeet beads made up of dew claws, shells, hair pipe bone beads, Eagle claws and a miscellaneous assortment of glass trade beads. At the right, Kutenai beads are represented that are made up of imitation hair pipe beads, together with irregular-sized blue trade beads. At the top, Pend d' Orielle beads are shown. These are crude faceted beads which bear no resemblance to those found in the Columbia River and coastal areas. At the bottom, a string of small Hudson's Bay beads completes the picture.

The second important area of trade bead distribution was along the Columbia River and its tributaries and along the Pacific Coast from Alaska to California, where the glass trade beads reached the zenith of their value. Hundreds of types of glass trade beads have been found in this area; even the so-called "hair pipe" beads that were used so extensively by the Sioux and other Great Plains Indians in the construction of their elaborate breast ornaments. However, the bead most important in the Columbia River regions was called, in "Chinook jargon," "Tyee Kamosuk" or "chief

bead." This expression does not mean that these beads were reserved for the exclusive use of the tribal chief, but rather they were the preferred bead of the population in general.

These beads were ultramarine blue in color, but some of the exact beads in size and shape are also found in dark and medium green and may have been desirable to some of the Indians over the blue ones. However, the blue beads outnumbered the green ones at a ratio of about 100 to one, which seems to indicate that the blue beads were the favorite, but the possibility must not be overlooked that perhaps the green ones were harder to obtain and therefore of greater value.

The early explorers of the Columbia River referred to the beads they saw as cheap and common. They, of course, were using their own standards of value on objects that, to the Indians, represented the exact opposite. It seems quite certain that when an Indian at last acquired a string of these beads, after perhaps exchanging a full season's catch of furs for them, they were, at least to him, anything but common and cheap. But, as competition between the different trading companies intensified, the quality and uniform shape of the chief bead did improve to the extent that they were as good, if not better, than anything that can be bought today. In *Figure 59-A*, there are to be seen the chief beads in blue, as well as the green ones mentioned above. In the center is a string of "fancy beads" that shows at least fifty varieties of beads that fall within the terminology used to describe them. They may be called Polychromes, Paisleys and Venetians, or flowered beads.

In the string of fancy beads mentioned above, there is present the Pompadour bead that acquired its name from a favorite lady of Louis XV of France. Also shown is a bead called the Kitty Fisher eyes, named after a famous English actress. The prince of all beads, however, was the "Pater Noster," or "Our Father," chevron or star bead. These beads were Polychromes and were made in layers. Most common are the ones that were made in layers of dark blue, brick red and opaque white that ran through the length of the bead resulting in a cog wheel design of 12 points. These beads were made periodically from the early part of the 16th century until the 20th century, and are quite widespread over

the United States and Canada in limited numbers.

There exists a great many different opinions and confusion among collectors and others concerning the correct names that various beads are to be called. Even the well known Cornaline d' Aleppo or Hudson's Bay beads have, in some areas, acquired names that have no basis of fact. It is the generally accepted opinion among serious students of the glass bead, that it is next to impossible to relate in detail all of the facts concerning the glass bead. Many misconstrued notions and fanciful local terms have only added to the confusion. There are, however, some beads that have well established names that are beyond dispute.

The third main route by which glass beads reached their ultimate destination was by the way of the Mississippi River. From New Orleans, they were transported up the Mississippi River to St. Louis where they were exchanged for furs by the various trading companies that made St. Louis their headquarters. From St. Louis, trade beads were dispersed in every direction. To the southwest, by way of Santa Fe Trail, many trade beads found their way in to that region, especially after the United States had taken over possession of the area. To the northwest, the Missouri River and all of its tributaries were traversed and extensive trading was carried on with the Indians by independent business concerns, individuals and, most importantly, the American Fur Company who played a dominant role in the exchange system of that area.

The Judith River Basin was the most important area in which to establish a trading relationship with the Indians at that time. Within this area, many forts were built which, in reality, were more of an armed trading post than they were forts built as a defensive measure. In 1832, the American Fur Company established a trading post among the Blackfeet Indians, and for many years made handsome profits from this venture. However, in 1844, serious trouble developed between the white traders and the Indians due to the savage killing of a group of Indians that had arrived at Fort McKenzie on a peaceful mission. As a consequence, from 1844 till 1855, a state of seige existed in this area and trading ventures were greatly curtailed. How-

ever, by this time the glass trade bead had reached points far and wide by way of the Missouri River route, and it is the author's opinion that the Blackfeet and Crow Indians possessed more of the so-called "fancy" beads than did any other tribes in North America.

Many students of glass trade bead history are of the opinion that the fancy beads found in the Columbia River Basin came by way of the Missouri River route. It is true that the Indians who controlled the upper regions of the Missouri River possessed more Venetian type beads than did other Indians. However, it is the author's belief that, whereas most fancy beads originated from the same basic source, those that are found within the Missouri River drainage system represent a type of bead that was made at a different time period than those that are found in the Columbia River region. This conclusion is based on the fact that of all the fancy beads from both areas that have been collected or examined by the writer, no two have been seen that match each other. However, the chief bead in the Columbia River area has been seen by the author as far east as Cut Bank, Montana where they were selling to collectors for two dollars each.

Tribal exchange must have played a major role in the distribution of trade beads. Some distinct types are found far from the place that they are known to have been common. It is possible to find beads of most types far from the place of original distribution. The dentalia shell bead is a good example as it is a recorded fact that they were present in the Great Plains area and have even been reported to have reached the Atlantic Coast.

Surely, the glass trade beads, with their multiple colors, different sizes and shapes, must have made a great impression on the American Indian who had never before seen such beautiful objects. It is impossible to ascertain the rate of exchange between the white man's glass bead and the Indians' furs, but there is little doubt that the trade was seldom, if ever, in favor of the Indian.

Thus, the simple glass bead, sought after and treasured by the American Indians, may well have played a most important role in the winning of Western America by the White man than did devious treaties, guns, knives and rum combined. □

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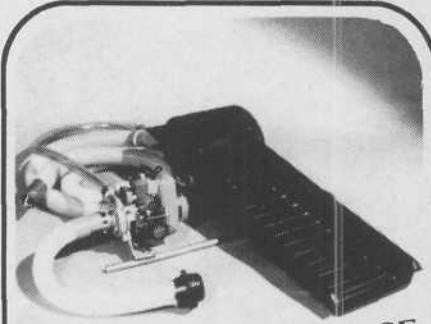
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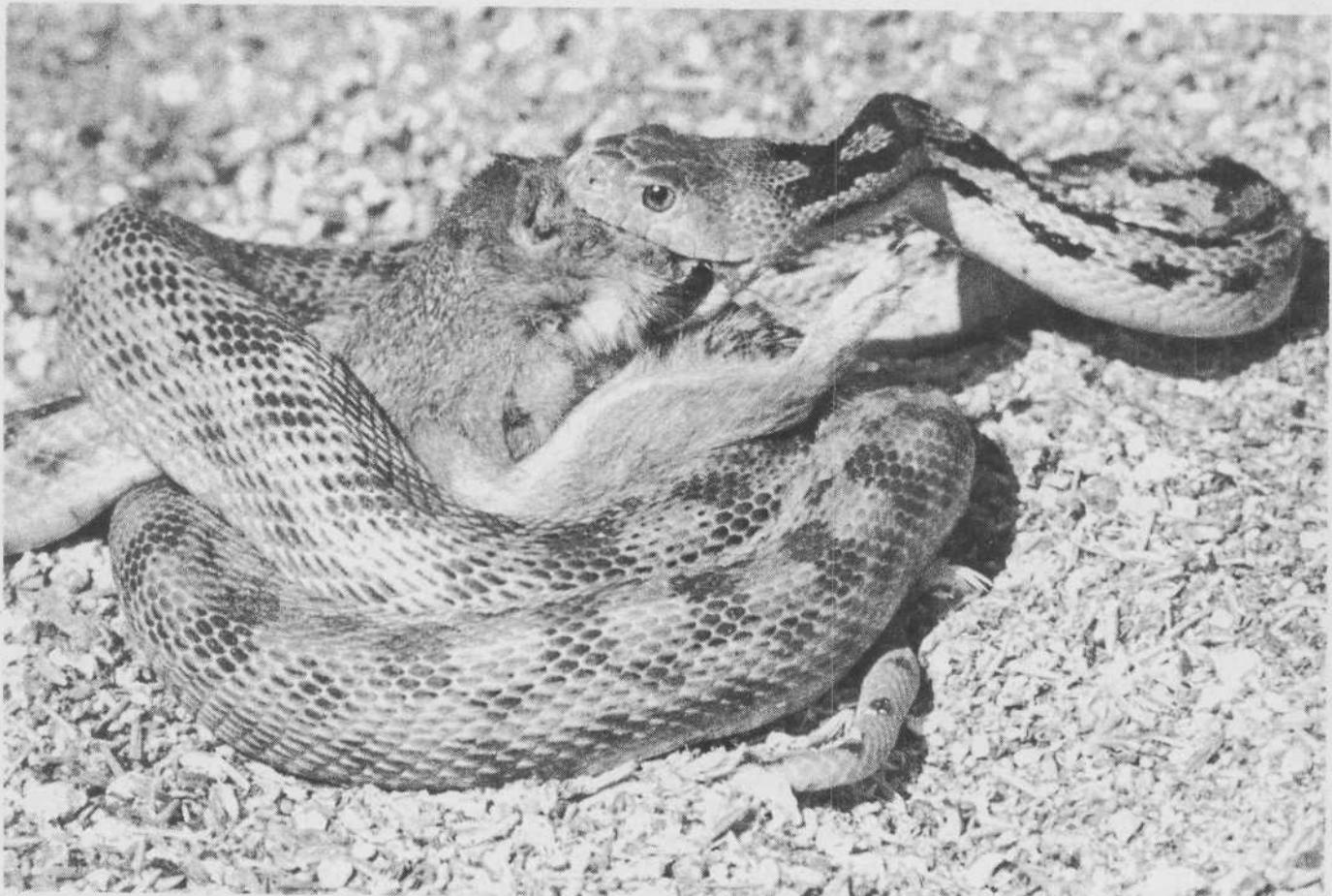
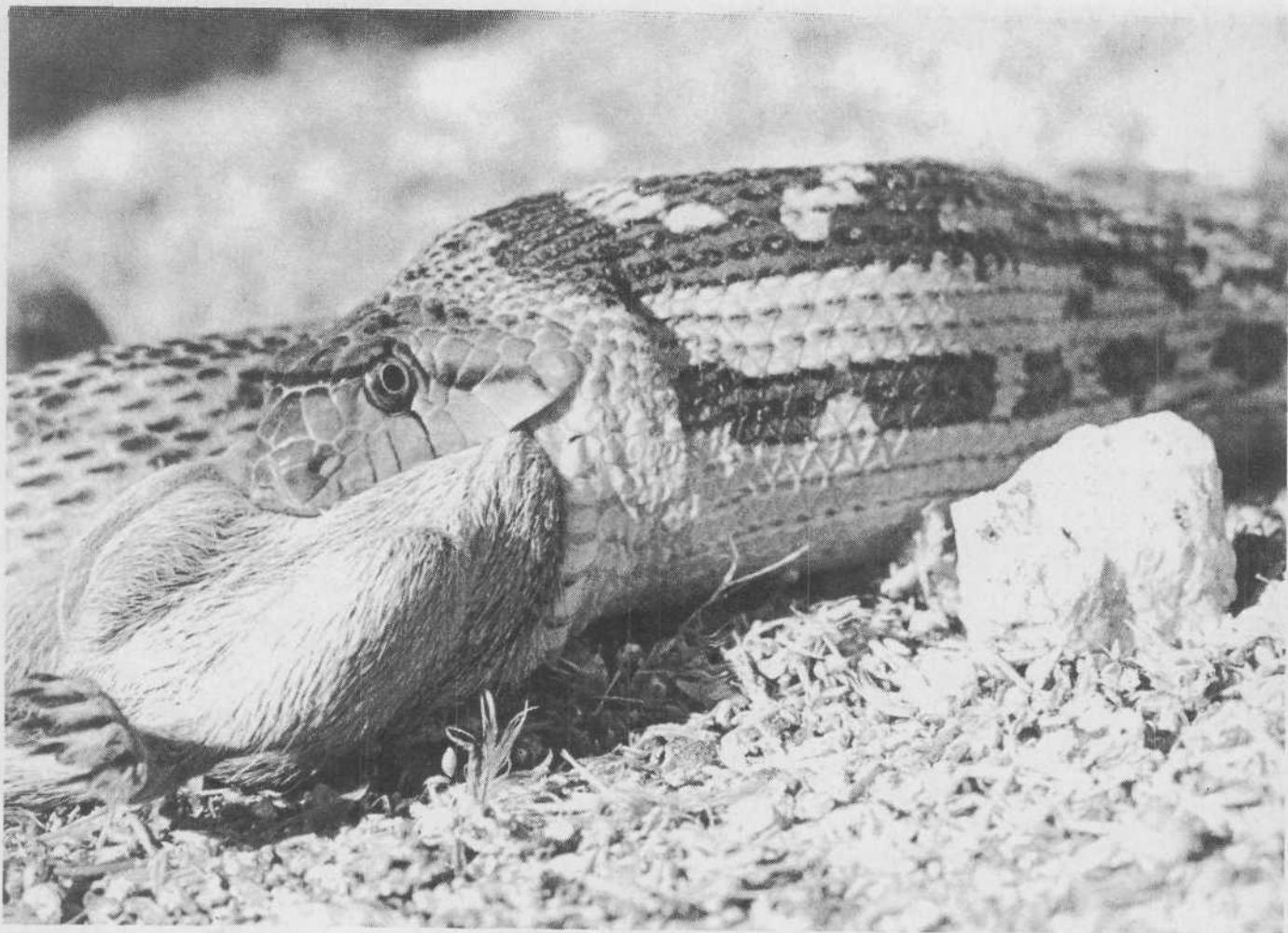
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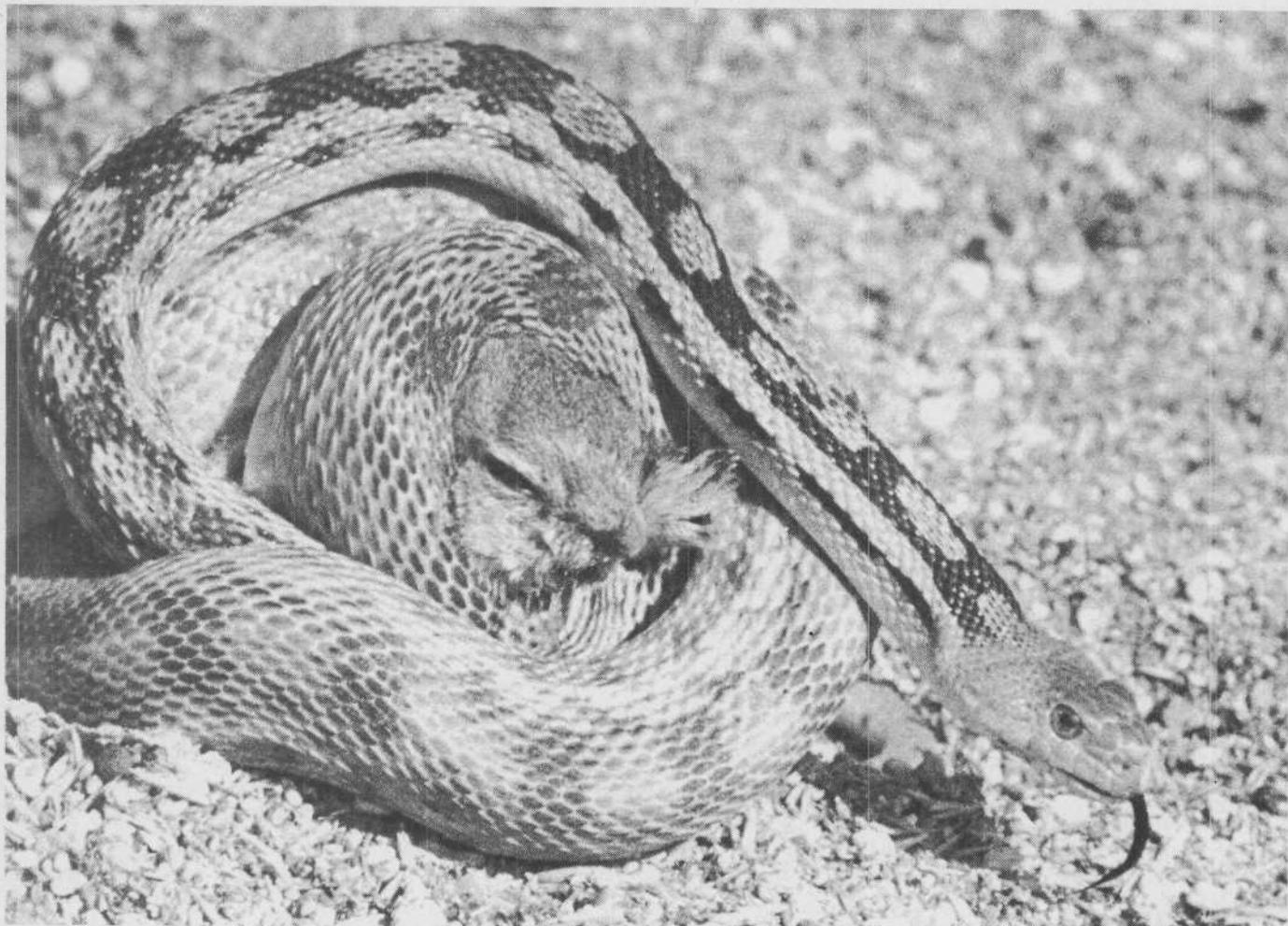
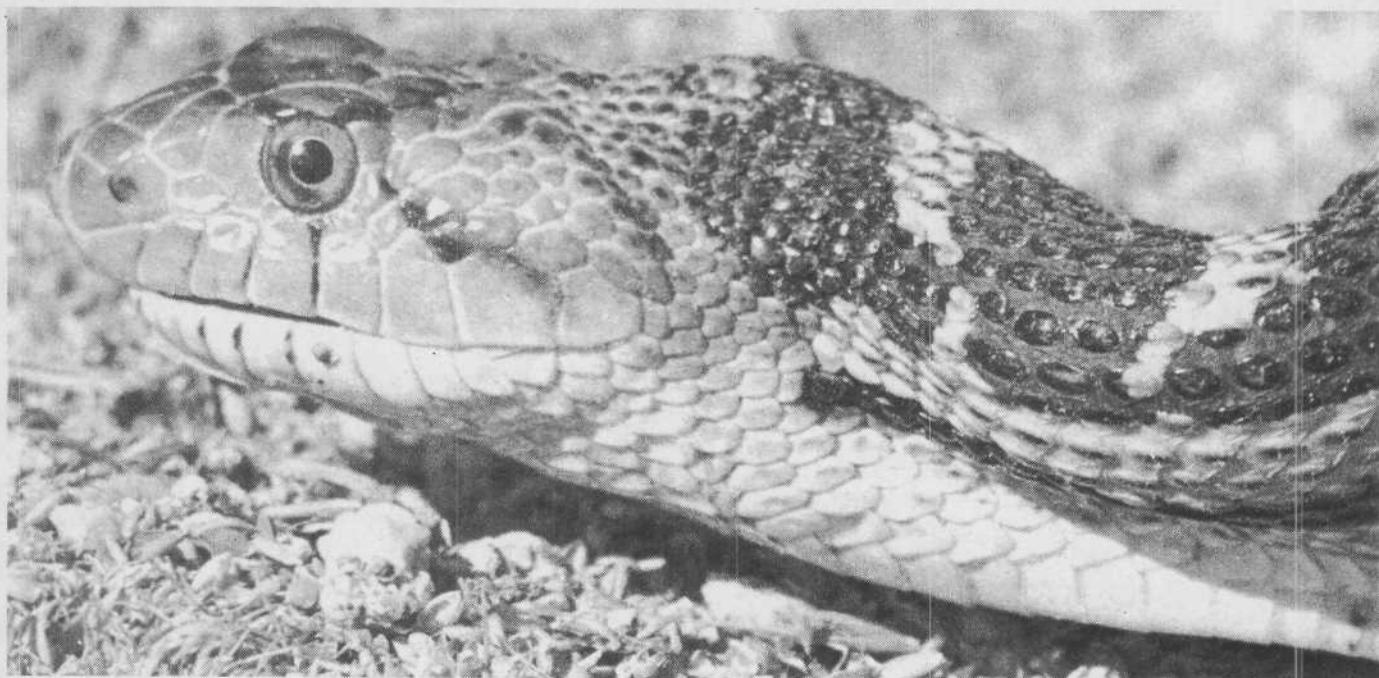
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Desert Life

by
Hans
Baerwald

The law of the jungle maintains the balance of life on the desert, just as in other parts of the world. Clockwise, a gopher snake goes searching for food; catches a small rodent and causes death by constriction; starts to feed on his victim; and finally his jaws unhinge, allowing him to swallow completely.



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Rambling on Rocks

by
Glenn and
Martha Vargas

THE RADIOACTIVE CLOCK: Telling Us the Age of the Earth

EVER SINCE the dawn of scientific thought, the age of the earth has been pondered. Many methods of determining it have been devised; most of them worthless. One of the most ingenious, in our minds, was using the amount of dissolved salt in the oceans. The amount of salt in the oceans was first calculated. Then the rate that salt was being dissolved out of the rocks and carried to the oceans was next calculated. These two then gave a figure, which is very close to what is now felt is the correct age.

What is the age of the earth? Scientists generally agree on approximately five billion years. This admittedly is a tongue-in-cheek figure, for no one is certain that the oldest rocks have been found.

This figure was arrived at by measuring the rate of decay of radioactive elements. Some elements, such as uranium, are always in a state of decay after they have solidified from molten lava. Other elements have what are known as radioactive isotopes (really varieties) which go through a similar decay.

Two factors must be known to be able to use a radioactive element for time dating. First, the end product of the decay must be recognizable, and the amount that has been derived from the original must be easily determined. Second, the half-life of the original must be known.

The half-life is the period of time that a radioactive element will lose half of its radioactivity; in other words, half its size or weight. The shortest known half-life is less than one ten-millionth of a second, the longest, better than 100 trillion years.

If we assume that an element has a half-life of one year, and it weighs 80 pounds at the start, at the end of one year, it would weigh 40 pounds, the second year, 20 pounds, the third year, 10 pounds, and so on indefinitely. As the action goes on, theoretically at least, the material would never disappear, even though after many years there would be only a very, very small amount.

The radioactivity of uranium is used to date our oldest rocks, and its end product is lead. To reduce the enormous half-life (approximately four trillion years) to a simple and usable formula, it can be said that one gram of uranium will yield slightly over one seven-billionth gram of lead in one year. When a scientist can calculate the amount of uranium present in a piece of lava, and can also calculate the amount of lead that resulted from the decay, he can then determine the age of the rock. The equation is simple, but the determining of all factors is not.

The use of uranium is excellent to determine the age of the earth's oldest rocks, but it is unwieldy to determine ages of about one million years. For this purpose, a number of isotopes are used. The most useful at present is the isotope of potassium known as potassium-40. The number is the atomic weight, which really is the mass in relation to the mass of the other elements. The normal atomic weight of potassium is 39.1. Potassium-40, with a half-life of about 100 million years, decays into calcium-40, which further decays into argon-40. Argon is a stable gas that never combines with any other element to form a mineral. If none of the argon-40 has escaped out of the rock, the age is readily determined. This is known as the potassium argon method.

The potassium-argon method is popular because potassium is a common constituent of feldspars and micas which are common in igneous rocks. The amount of potassium-40 in any rock is small, but it has been found to be a reliable indicator. This method is reliable over a span of 100 million to two billion years, but is

most used for periods under one billion

For many years, scientists searched for a radioactive element that would be usable for periods less than 50,000 years. Only recent did Willard F. Libby, formerly chief of our Atomic Energy Commission, discover what is called the Radiocarbon Dating Method.

Carbon is part of the bodies of all living things. The isotope of carbon that is used is known as carbon-14. Normal carbon is a mixture of carbon-12 and carbon-13, neither of which is radioactive, but the ratio of carbon-14 to these two is constant. The formation of carbon-14 is interesting.

The earth is constantly being bombarded by cosmic rays, which all living things can tolerate. These rays, however, tend to break down the atoms of certain gasses in our atmosphere. Nitrogen is the most common gas, and when a cosmic ray strikes an atom of nitrogen, it loses some of its mass and is changed into carbon-14. This now combines with oxygen to form radioactive carbon dioxide. Plants use carbon dioxide for the manufacture of carbohydrates, and the carbon-14 dioxide is taken in also. The isotope now becomes part of the body of the plant. The plants are eaten by animals, and thus all living things soon have the ratio of both types of carbon locked in their bodies.

After the plant or animal dies, the carbon-14 starts to revert back to nitrogen with a half-life of 5,700 years. The nitrogen escapes back to the atmosphere, but the remaining ratio of carbon-14 to normal carbon tells the archeologist the period of time that has elapsed since the death of the organism.

Radio-carbon dating has been very useful to archeologists, and their findings often have a romantic aura. The carbon in the ashes of fires of prehistoric man have told us how long ago they lived, even though they have left very little other remains.

The Dead Sea Scrolls of the Book of Isaiah, recently found in a cave in Palestine, have been dated at about 1,900 years. The cave paintings in France are dated at 15,000 years. Many of the ruins of our desert southwest have been dated by this means.

Our knowledge of many features of the earth, as well as age, has been increased by radioactive dating. The sequence of appearance of the islands in a mid-ocean

chain can be determined by this method. The length of life of a volcano, and whether or not it had a sister-volcano erupting at the same time can be determined. The correct position of lava flows that have been turned upside down by later earth movements can be unraveled. There is an almost endless list of facts now known, and potential facts to be learned, with the help of radioactive dating.

All the geologist needs to tell the time when the earth first solidified from a molten ball, is to find the oldest rock. He may be somewhat frustrated by the thought that he cannot be sure he ever has it, but he certainly will never lack for something to look for!

Potassium-argon will tell the student of land forms when a mountain range appeared, or when a valley filled with lava. The archeologist can date the houses that prehistoric man built, or the caves that he lived in. He can date the bones and logs he finds in sediments. Here he is not necessarily looking for the oldest, but trying to find the age of what he has in his hand.

Radio-carbon dating can even disprove theories. The one that saddened us a bit was the discrediting of Thor Hyerdahl's theory of Polynesian man having originated in South America. Nearly everyone knows of his voyage in the boat Kon-tiki. Here is a man that not only had a theory, but also had the nerve to go great lengths and great risk to try to prove it. His voyage is an epic to thrill anyone, but radio-carbon dating of artifacts of some Pacific islands proved that man was there much longer than even Hyerdahl suspected. We looked upon this discrediting as a cruel twist of fate.

We have discussed extremely large numbers of years above. Some numbers are difficult for many people to grasp, and relate to what we know in our normal lives. Some years ago we saw an excellent key to understanding the huge period of the age of the earth.

An average book contains about one million words; a number that most of us can easily understand. If we compare this number of words to the length of the earth's history, the span of human history will be the last word. Christianity will be the last letter of the last word, and the period at the very end will be the life of the oldest living person.

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Trying To Locate Author . . .

I am trying to contact Mr. Lawrence P. James, whose work has appeared in *Desert Magazine*. Specifically, I am interested in the article by James that appeared June, 1967 entitled *The Search for Lopez*.

ROBERT HELEN,
Box 136 Hedrick Hall
250 De Neve Dr.,
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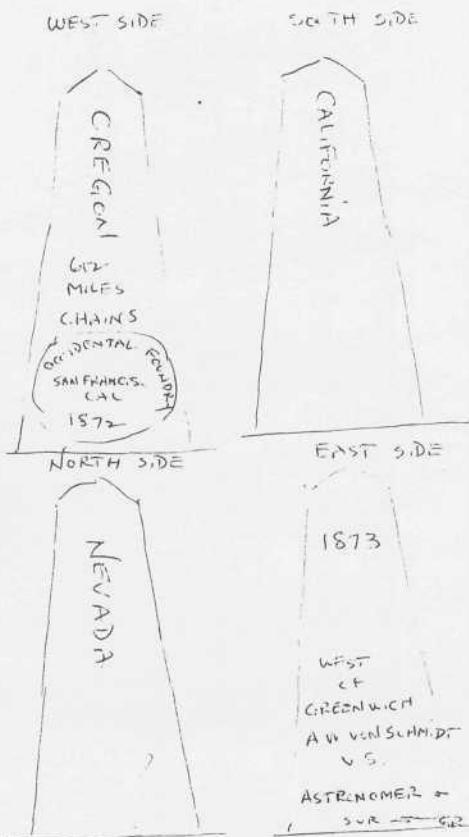
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I have read your magazine for many years with a great deal of interest.

Do you have any information on a marker located on the boundary of California and Nevada, close to the bank of the Colorado River on the California side? It is unusual because it shows Oregon on one side. Enclosed is a picture and sketch of each side. Some of the letters have rusted off the six-foot, cast iron marker.

Perhaps a reader of *Desert* might be able to identify it.

CARL H. LANGJAHR,
Ventura, California.



Calendar of Events

MARCH 1-3, Phoenix Gem & Mineral Show—Silver Jubilee of Gems sponsored by the Maricopa Lapidary Society, Inc. Coliseum, State Fairgrounds, Phoenix, Arizona. Camper parking, Field Trip. Write 3340 N. 64th Dr., Phoenix, AZ 85033.

MARCH 2 & 3, Monrovia Rockhounds' 15th Annual Gem & Mineral Show, Masonic Temple, 204 W. Foothill Blvd., Monrovia, Calif. Free admission and parking. Arrowhead making and features to appeal to the whole family.

MARCH 2 & 3, Ventura Gem & Mineral Society's 12th Annual Show, Ventura County Fairgrounds, Ventura, Ca. Dealers full, camping. Show Chairman: Ed Turner, P.O.Box 405, Santa Paula, CA 93060.

MARCH 16 & 17, 14th Annual "Wonderland of Gems," sponsored by the Northrop Gem and Mineral Club, Northrop Recreation Clubhouse, 12329 Crenshaw Blvd., Hawthorne, California. Free admission and parking. Displays, live demonstrations, guest exhibitors, refreshments and prizes. Show Chairman: Howard Johnson, 20522 Wood Ave., Torrance, CA 90503.

MARCH 30 & 31, Norwalk Rockhounds Club's Annual Gem Show, 12345 E. Rosecrans Blvd., Norwalk, Calif. Free admission and parking. Dealers. Member and guest displays.

APRIL 6 & 7, 20th Annual Fast Camel Cruise sponsored by the Sareea Al Jameel Four Wheel Drive Club, Indio, California. Box Canyon off Interstate 10. Includes barbecue dinner. For reservations write the club c/o P.O.Box 526, Indio, California 92201.

APRIL 6 & 7, Woodland Hills Rock Chippers 5th Biennial Gem Show, 4029 La Virgenes Rd., Malibu Canyon, 8 miles west of Woodland Hills and 1.3 miles south of Ventura Blvd. Free parking and admission. Prizes. Working demonstrations.

APRIL 20 & 21, "World of Gem Show" sponsored by the Berkeley Gem & Mineral Society, Contra Costa College, 2600 Mission Bel Dr., San Pablo, Calif. Display for the blind, demonstrations, hand-crafted jewelry from guest exhibitors and members. Admission 75 cents for adults, 25 cents for children.

APRIL 27 & 28, Desert Gem Roundup of Antelope Valley, 5th Annual Spring Show, sponsored by the Antelope Valley and Palmdale Gem & Mineral Clubs, Fair Center Hall, Antelope Valley Fairgrounds, Lancaster, Calif. Free admission, parking and door prizes. Ample camping on the grounds for minimum fee (limited hook-ups). Desert wildflowers should be abundant.

APRIL 27 & 28, 16th Annual Gem & Mineral Exhibit sponsored by the Arrowhead Mineralogical Society, St. Joseph's Center, 17020 Arrow Blvd., Fontana, Calif. Admission and parking free. Dealers, grab bags, donation awards, many mineral and lapidary exhibits.

MAY 4 & 5, Joshua Tree Turtle Days, Sportsman's Park, Joshua Tree, Calif. Gem and mineral exhibits, dealers, tailgaters invited. Contact Claud Irwin, 61766 Valley View, Joshua Tree, Calif., 92252.

MAY 4 & 5, 2nd Annual Million \$ Gem Show, Los Angeles County Fairgrounds, Pomona, Calif. Dealer space filled.

MAY 11 & 12, "Searchers Gem Roundup"—15th Annual Show, sponsored by Anaheim Searchers Gem & Mineral Society. Union Auditorium, 8550 Stanton Ave., Buena Park, Calif. Free admission and parking. Exhibits, dealers, prizes, demonstrations.

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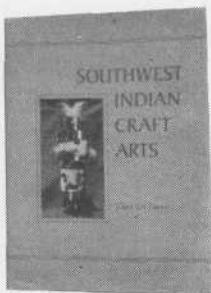
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